U. S. Government RESEARCH REPORTS

March 10, 1961
Vol. 35, No. 3

UNIVERSITY OF MICHIGAN
MAR 20 1961
CHEMISTRY LIBRARY

. . . A monthly listing of Government research reports available to industry . . .

In this issue:

High-Speed Image Shutter Unit. (PB 171 197)

Investigation of Organic Semiconductors. (PB 171 340)

The Present Status of Russian Metallurgy. (PB 171 307)

Nitrogen Tetroxide Corrosion Studies. (PB 171 301)

Response of Plates to Moving Shocks. (PB 171 302)

An Analyzer for Moisture and Solids in Jet Fuels. (PB 171 303)

A Closed Circuit TV System for Passive Use at Night. (PB 161 968)

Protective Coatings for Refractory Metals. (PB 171 193)

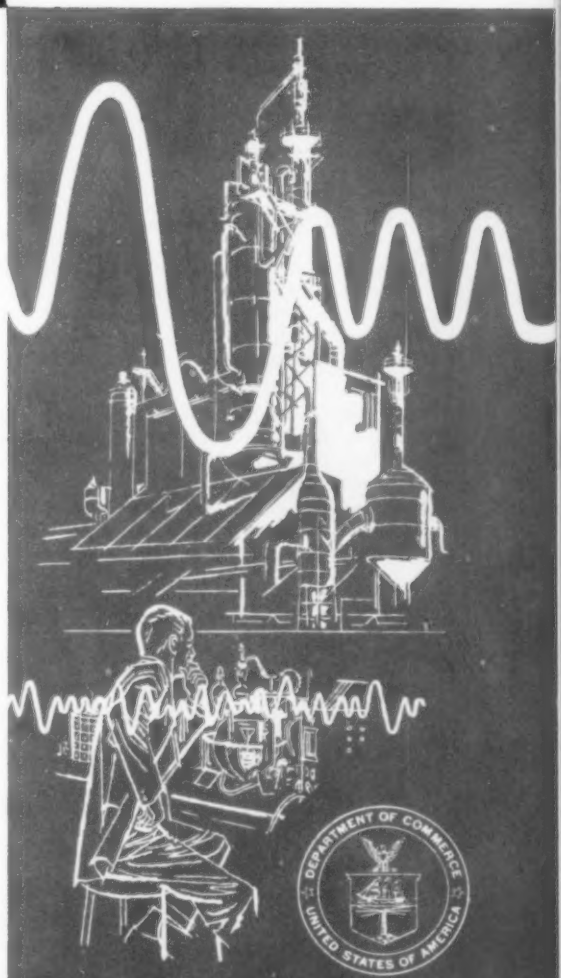
Recent Developments in Casting Resins and Technology for Electrical Encapsulation Applications. (PB 171 034)

Review of Some Unconventional Methods of Machining. (PB 161 225)

Availability and Mechanical Properties of High-Strength Steel Extrusions. (PB 151 097)

Complete list of printed reports begins on page iii

Chemistry
Z
7913
.U58



U. S. DEPARTMENT OF COMMERCE
BUSINESS AND DEFENSE SERVICES ADMINISTRATION
Office of Technical Services

The PB Reports . . .

announced in this publication have just been released, usually by agencies of the U. S. Government, for dissemination to the public. In most instances they result from Government or Government-sponsored research.

The Office of Technical Services is responsible, under Public Law 776, 81st Congress, for the collection and distribution of these technical reports in the interest of American science and industry.

The more important reports are reprinted for sale to the public by OTS. Many of the reports are so specialized that the demand for them does not warrant reproduction of printed copies; originals of these documents are deposited at the Library of Congress. There they may be inspected in the Annex Reading Room, or copies may be ordered from the Library in either photocopy or microfilm.

PB reports of special interest to smaller businesses are abstracted in OTS's monthly *Technical Reports Newsletter*, available from the Superintendent of Documents, Washington 25, D. C., at $1 a year domestic, $1.50 foreign.

Since 1945 thousands of business firms have used PB reports in their research programs. These reports now constitute one of the world's largest collections of non-confidential technical information, numbering over 250,000 items. OTS has published catalogs of related reports in more than 300 areas of industrial interest. For further information relative to any of its activities, you are invited to write OTS, U. S. Department of Commerce, Washington 25, D. C.

Except to the extent indicated by acknowledgment of authorship, OTS does not edit PB reports, nor does it accept responsibility for the information and conclusions contained in them. If copyrighted material appears, permission for its use should be requested from the copyright owners. Any national security restrictions that may have applied to these reports have been removed. Patents may cover the subject matter of any report, and the reader is advised to make patent searches before developing applications based on the reports.

How To Order

ALWAYS USE COMPLETE TITLE AND PB NUMBER of each report ordered. The letter "s" accompanying some PB numbers means "supplement," "t" means "translation," and "r" means a partial or complete revision. These letters should be included as part of the PB number. Prepayment is required.

TO ORDER FROM LC • Address your order to Library of Congress, Photoduplication Service, Publications Board Project, Washington 25, D. C. Make check or money order payable to Chief, Photoduplication Service, Library of Congress. State whether report is desired in microfilm or photocopy. Microfilm copies are in 35 millimeter film and require special reading equipment; if you do not have such a machine you may be able to use one at a library in your area.

TO ORDER FROM OTS • Address your order to Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Make check or money order payable to OTS, Department of Commerce. Reports available from OTS may also be ordered through Department of Commerce field offices.

TO ORDER FROM OTHER SOURCES • When an agency other than OTS or LC is the source, use the full address included in the abstract of the report. Make check or money order payable to that agency.

U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

BUSINESS AND DEFENSE SERVICES ADMINISTRATION
William A. White, Sr., *Administrator*

Office of Technical Services
John C. Green, *Director*

Issued monthly. Annual subscription $9 ($2.50 additional for foreign mailing). Single copy $1. Make remittance payable to Superintendent of Documents and mail either to a Department of Commerce field office or to Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Address changes should be sent to Superintendent of Documents.

Contents may be reprinted freely. Mention of source will be appreciated

Use of funds for printing this publication approved by the Director of the Bureau of the Budget, July 18, 1958

CONTENTS

	Page
PRINTED REPORTS AVAILABLE FROM OTS ANNOUNCED IN THIS ISSUE	iii
BIBLIOGRAPHY	257
ASTRONOMY	257
Astrophysics	257
BEHAVIORAL SCIENCES	259
Human Engineering	259
Personnel and Training	260
Psychology	262
BIOLOGICAL SCIENCES	265
Anatomy and Physiology	265
Biochemistry	269
Microbiology	270
Neurology and Psychiatry	270
Pathology	271
Pharmacology and Toxicology	272
Radiobiology	273
Zoology	273
CHEMISTRY	274
Inorganic Chemistry	274
Organic Chemistry	274
Physical Chemistry	275
EARTH SCIENCES	278
Climatology and Meteorology	278
Frost Science	281
Geodesy	282
Geography	282
Oceanography	282
Physics of the Atmosphere	283
ENGINEERING	284
Aeronautical Engineering	285
Electrical and Electronic Engineering	288
Ordnance, Missiles, and Satellite Vehicles	305
Sanitation and Safety Engineering	309
Ship Building	310
FOOD, HANDLING, AND PACKAGING EQUIPMENT	310
MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT	310
Engines and Propulsion Systems	310
Manufacturing Equipment and Processes	313
Transport, Traction and Hoist Facilities	313
MATERIALS	313
Fuels, Lubricants, and Hydraulic Fluids	314
Plastics	315
Rubber and Elastomers	316
MATHEMATICS	317
Computing Devices	323
MECHANICS	324
Aerodynamics and Pneumatics	325
Hydrodynamics, Hydraulics, and Hydrostatics	327
Statics, Kinematics, and Kinetics	328
METALLURGY	329
Ferrous Metals	330
Structural Metallurgy and Corrosion	330
NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY	331
Elementary Particles	332
Instruments and Installations	333
Radioactivity	334
PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT	335
PHYSICS	336
Electricity and Magnetism	336
Electronics	337
Molecular Physics and Spectroscopy	338
Optics	339
Solid State Physics	341
Theoretical Physics	346
Thermodynamics	348
Wave Propagation	349
RESEARCH METHODS, TECHNIQUES AND EQUIPMENT	351
Information Theory	351
Photographic Equipment	352
MISCELLANEOUS	352

	Page
ATOMIC ENERGY COMMISSION REPORTS	353
BIOLOGY AND MEDICINE	353
CHEMISTRY	353
General	353
Separation Processes for Plutonium and Uranium	353
CONTROLLED THERMONUCLEAR PROCESSES	354
ENGINEERING AND EQUIPMENT	354
HEALTH AND SAFETY	354
INSTRUMENTS	354
ISOTOPES	354
METALS, CERAMICS AND MATERIALS	355
NUCLEAR EXPLOSIONS	371
PARTICLE ACCELERATORS AND HIGH-VOLTAGE MACHINES	371
PHYSICS AND MATHEMATICS	372
RADIATION EFFECTS ON MATERIALS	385
RADIOACTIVE WASTE	387
REACTORS	387
General	387
Power	388
TECHNOLOGY	390
Feed Materials	390
SOURCE INDEX	I-1
SUBJECT INDEX	I-5
NUMBER INDEX	I-13

Printed Reports Available From OTS Announced in This Issue

ASTRONOMY — Page

Development of a computer subroutine for planetary and lunar positions. Aug 60. 99p. (PB 171 196) $2.25 258

BEHAVIORAL SCIENCES

Bibliography of aerospace medical division reports in the fields of engineering psychology and training psychology, 1945-1960. May 60. 53p. (PB 171 332) $1.50 260

Judgments of the relative frequency of two random sequential events: Effects of duration of observation. Sep 60. 10p. (PB 171 313) 50 cents 268

BIOLOGICAL SCIENCES

Aerospace Medicine and Biology (formerly: Aviation Medicine) an annotated bibliography. Volume III: 1954 literature. 1960, 547p. (PB 171 029) $6.00 272

Bibliography on aeromedical research with abstracts. Dec 59. 107p. (PB 171 333) $2.50 265

Cumulative effects of borane toxicity as revealed by a clinical test. Aug 60. 14p. (PB 171 309) 50 cents 273

Human psychomotor performance under varied transverse accelerations. Aug 60. 54p. (PB 171 304) $1.50 269

Radiological health data. Volume 1, No. 9. Dec 60. 56p. (PB 161 371-9) $9.00/yr. 273

Renal responses to positive acceleration. Sep 60. 20p. (PB 171 343) 50 cents 269

CHEMISTRY

Far infrared spectra of substituted aromatic hydrocarbons. Sep 60. 189p. (PB 171 300) $3.00 275

Radiochemical production and fate of free radicals. Aug 60. 28p. (PB 171 310) 75 cents 277

EARTH SCIENCES

Bibliography on snow, ice and permafrost with abstracts. Volume XIV. Jan 60. 252p. (PB 171 190) $3.00 281

ENGINEERING

AC-DC voltage instruments 10-1000V full scale. 25 July 60. 20p. (PB 171 209) 50 cents 289

AC and DC voltage 10 to 1000 volts. 25 Sep 58. 29p. (PB 171 212) 75 cents 289

AC voltage, 0.0001 to 800 volts 60 CPS. 19 Sep 58. 30p. (PB 171 213) 75 cents 289

Capacitance, 0.1 to 1050 μμF direct substitution method. 7 Aug 58. 17p. (PB 171 219) 50 cents 289

Capacitance, 1 to 1050 μμF substitution method 1 MCPS. 14 Aug 58. 11p. (PB 171 220) 50 cents 290

Capacitance, 100 μμF to 1 μF direct method. 18 Aug 58. 16p. (PB 171 221) 50 cents 290

Capacitance, 100 to 1150 μμF direct method 1 MCPS. 15 Aug 58. 10p. (PB 171 222) 50 cents 290

Capacitance, 100 μμF to 1100 μF direct method 60 CPS. 19 Aug 58. 14p. (PB 171 223) 50 cents 290

Closed circuit TV system for passive use at night. 23 Nov 60. 18p. (PB 161 968) 50 cents 302

Comparison of special perturbation methods in celestial mechanics. Aug 60. 56p. (PB 171 337) $1.50 309

Corrosion of metals in sea water. Dec 60. 62p. (PB 171 344) $1.75 285

DC current instruments 1.0 to 200 amperes full scale. 26 Nov 58. 20p. (PB 171 210) 50 cents 290

DC resistance, 0.00001 to 1.0 ohm. 6 July 60. 11p. (PB 171 205) 50 cents 290

DC resistance 0.1 ohm to 100 megohms. 2 Sep 58. 13p. (PB 171 206) 50 cents 291

DC resistance 10 ohm to 1,000,000 megohms. 2 Sep 58. 10p. (PB 171 207) 50 cents 291

ENGINEERING (con.) Page

Decade resistors 0.1 to 100.000 OHMS per step (using L&N 4232-A1 bridge). 2 May 60. 17p. (PB 171 211) 50 cents 291
DC voltage 1.02 to 1000 volts. 27 Feb 58. 7p. (PB 171 214) 50 cents 291
DC voltage 0 to 1000 volts. 21 Feb 58. 11p. (PB 171 215) 50 cents 291
DC voltage instruments 15-1000 volts full scale. 3 Nov 58. 14p. (PB 171 217) 50 cents 291
DC voltage instruments 1-1500 MV full scale. 16 Oct 58. 16p. (PB 171 218) 50 cents 291
Dry chemical system for carbon dioxide removal from submarines. 23 Nov 60. 8p. (PB 171 046) 50 cents 309
Effects of temperature-time-stress histories on the mechanical properties of aircraft structural metallic materials. Part II. Stressed exposure of 7075-T6. Sep 60. 113p. (PB 171 328) $2.50 287
Frequency response to CPS to 10 MCPS, 0.5 MV to 5.2 V and AC voltage calibration DC to 10 MCPS, 0.1 to 5.2 volts. 18 Jan 60. 29p. (PB 171 216) $1.00 292
Hypersonic free flight research. Part I: Instrumentation evaluation and data analysis. July 60. 45p. (PB 171 194) $1.25 293
Hypersonic free flight research. Part II: Investigations of heat transfer and aerodynamic stability. July 60. 93p. (PB 171 195) $2.25 286
Inductance, 1.0 μH to 10 H direct method. 28 Aug 58. 23p. (PB 171 208) 50 cents 292
RADC reliability notebook. Supplement 1. 1 Sep 60. 215p. (PB 161 894-1) $3.50 304
Removal of organic contaminants from air by type 13X molecular sieve. 6 Dec 60. 19p. (PB 171 051) 50 cents 309
Self impedance of a circular loop in a conducting medium. 17 Aug 60. 13p. (PB 171 353) 50 cents 302
Smear-camera techniques. 18 Aug 60. 21p. (PB 171 352) 75 cents 308
Standards inductors, 100 μH to 10 H general radio 1482 series (using GR 1632 A bridge). 19 May 60. 13p. (PB 171 201) 50 cents 292
Standard resistor NBS type 1 ohm to 100,000 ohms (using L&N 4232-A1 bridge). 27 Apr 60. 12p. (PB 171 200) 50 cents 292
Supersonic aeroelastic effects on static stability and control. Part III. Aeroelastic interaction. July 60. 371p. (PB 171 192) $5.00 285
Supersonic speed flutter analysis of circular panels with edges elastically restrained against rotation. Aug 60. 85p. (PB 171 199) $2.25 286
Vapor cycle cooling systems for space vehicles. July 60. 27p. (PB 171 345) 75 cents 305
Voltage standing wave ratio, X-band (8.20 to 12.40 KMC) 1.01:1 to 10:1. 13 July 60. 13p. (PB 171 204) 50 cents 292

MACHINERY

Analytical studies on ion propulsion. Aug 60. 77p. (PB 171 305) $2.00 312
Effects of various exhaust blast deflectors on the acoustic noise characteristics of 1,000-pound-thrust rockets. Sep 60. 65p. (PB 171 308) $1.75 311
Review of some unconventional methods of machining. 29 Nov 60. 20p. (PB 161 225) 50 cents 313
Rocket-nozzle testing and evaluation. 7 Dec 60. 17p. (PB 161 227) 50 cents 311
Status of DOFL fuel cell program on 1 October 1960. 24 Oct 60. 13p. (PB 171 050) 50 cents 311

MATERIALS

Analyzer for moisture and solids in jet fuels. Sep 60. 34p. (PB 171 303) $1.00 315
Experimental studies of sub-atmospheric combustion. Aug 60. 65p. (PB 171 306) $1.75 315
Heat fused ceramic coatings for aluminum components of rocket launchers. 21 Oct 60. 19p. (PB 171 047) 50 cents 314
Internal and surface temperatures of rubber exposed to direct sunlight. 31 Aug 60. 11p. (PB 171 042) 50 cents 317
Investigation of the high speed impact behavior of fibrous materials. Part I: Design and apparatus. Sep 60. 39p. (PB 171 311) $1.00 314
Ozone resistance of SBR vulcanizates. 31 Aug 60. 34p. (PB 171 043) $1.00 317
Recent developments in casting resins and technology for electrical encapsulation applications. Nov 60. 34p. (PB 171 034) $1.00 316

MATHEMATICS

Distribution-free statistical tests. Aug 60. 387p. (PB 171 312) $5.00 318
Existence theorem for the equation $u_{xyz}=f$. 12 July 60. 24p. (PB 171 349) 75 cents 321

Page

MATHEMATICS (con.)

First aid for pet projects injured in the lab or on the range or what to do until the statistician comes. 29 Jan 52. 59p. (PB 171 327) $1.50 321
Linear bounded automata. June 60. 29p. (PB 171 339) 75 cents 324
On calculation solutions of quasi-linear, first order partial differential equations. 1 Sep 60. 26p. (PB 171 350) 75 cents 321
On the capacity of the icosahedron. 1 Sep 60. 11p. (PB 171 354) 50 cents 321
The solution of the characteristic and the Cauchy boundary value problems for the Bianchi partial differential equation in independent variables by a generalization of Riemann's method. 27 July 60. 192p. (PB 171 351) $3.00 321
Some results on transformations in the analysis of variance. Aug 60. 24p. (PB 171 334) 75 cents. 318
Upper and lower bounds for the capacitance of the regular solids. 28 Sep 60. 104p. (PB 171 355) $2.50 321

MECHANICS

Force 0 to 60,000 lbs. (approx.) tension only. 15 July 60. 34p. (PB 171 203) 75 cents 328
Response of plates to moving shocks. Aug 60. 37p. (PB 171 302) $1.00 326

METALLURGY

Availability and mechanical properties of high-strength steel extrusions. 26 Oct 60. 63p. (PB 151 097) $1.75 330
Handbook of Soviet alloy compositions. 25 Aug 59. 258p. (PB 171 331) $4.00 329
Nitrogen tetroxide corrosion studies. July 60. 64p. (PB 171 301) $1.75 331
Notch sensitivity of refractory metals. Sep 60. 115p. (PB 171 198) $2.50 329
Notes on large-size furnaces for heat treating metal assemblies. 25 Aug 60. 9p. (PB 161 213) 50 cents 330
Present status of Russian metallurgy. Sep 60. 13p. (PB 171 307) 50 cents 329
Production and availability of some high-purity metals. 2 Dec 60. 48p. (PB 161 226) 50 cents 329
Protective coatings for refractory metals. Aug 60. 54p. (PB 171 193) $1.50 329
Research and development on the effects of high pressure and temperature on various elements and binary alloys. July 60. 71p. (PB 171 348) $2.00 330
Toughness of steel sheet: the advantage of laminating. Oct 60. 24p. (PB 171 044) 75 cents 330

MISCELLANEOUS

Report of NRL Progress. Feb 61. (PB 171 315) $1.25, $10.00/year 352

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

Energy distribution of electrons from ionizing collisions of heavy particles. Sep 60. 59p. (PB 171 335) $1.50 333
Polymerization of styrene and butadiene by gamma radiation. 31 Aug 60. 13p. (PB 171 041) 50 cents 332
Transmission matrix method for penetration problems. Aug 60. 299p. (PB 171 341) $4.00 335

PHYSICS

Investigation of organic semiconductors. Sep 60. 83p. (PB 171 340) $2.25 342
Investigation of the infrared absorption of selected aromatic compounds in the region of 2 to 35 microns. Sep 60. 44p. (PB 171 342) $1.25 339
Mass in air 1 gram to 30 kilograms direct weighing method. 8 June 60. 20p. (PB 171 202) 50 cents 336
Research on the pyroelectric properties of single crystals of cadmium sulfide and zinc sulfide. Aug 60. 151p. (PB 171 338) $2.75 345
Quarterly radio noise data, June, July, August 1960. 4 Nov 60. 68p. (PB 151 377-7) $.1.75 350
Steel mirrors for a streak camera. Aug 60. 13p. (PB 171 191) 50 cents 341
Stoichiometry and electronic properties of PbTe. July 60. 61p. (PB 171 356) $1.75 345
Theory of plasmas, Part I. Aug 60. 69p. (PB 171 336) $1.75 347
Thermophysical properties of solid materials. Volume I. Elements (Melting temperature above 1000°F). Aug 60. 735p. (PB 171 329-1) $8.00 348

Page

RESEARCH, METHODS, TECHNIQUES AND EQUIPMENT

High-speed image shutter unit. Apr 60. 62p. (PB 171 197) $1.75 352

For your convenience OTS order blanks (Form TS-37) are available on request from the OFFICE OF TECHNICAL SERVICES.

U. S. Government RESEARCH REPORTS

U. S. DEPARTMENT OF COMMERCE

BUSINESS AND DEFENSE SERVICES ADMINISTRATION

OFFICE OF TECHNICAL SERVICES

Vol. 35, No. 3 Pages 257-390 March 10, 1961

BIBLIOGRAPHY

David Taylor Model Basin, Washington, D. C.
UNCLASSIFIED LIST OF REPORTS ISSUED THROUGH 30 JUNE 1957 AND SUPPLEMENTS I-XI, 1 JULY 1957-30 JUNE 1960. Sep 57, rev. July 60. 167p. 2,047 refs. Rept. 1160, supersedes TMB rept. 597.
Order from LC mi$7.80, ph$25.80 PB 153 726

This report released for sale to the public 16 Jan 61.

This list is divided into four sections, each numbered separately, as I-1, II-1, III-1 and IV-1. Section I contains the regular series of TMB formal reports numbered consecutively without any preceding letter designation. Section II contains the R-series, which was discontinued in 1947. Reports in this series are designated as R-1, R-45, etc. Section III contains the C-reports which have been declassified. These reports still carry the C designation preceding the number. Section IV contains the translations, which are numbered as T-1, T-25 and so forth. Numbers listed without titles are either unpublished or not available for distribution. Missing numbers in the list are for classified reports not included in this list.

ASTRONOMY

Pennsylvania U., Philadelphia.
THE CORRELATION OF STELLAR SHADOW BAND PATTERNS WITH UPPER AIR WINDS AND TURBULENCE, by W. H. Protheroe and Kwan-Yu Chen. Final technical rept. on Contract AF 19(604)1570. 1 Sep 60, 161p. 11 refs. GRD no. TR-60-287; AD-245 500.
Order from LC mi$7.80, ph$25.80 PB 152 834

Measurements leading to a correlation of stellar scintillation and upper air winds have been made using two techniques. The first consisted of comparing the ratio of the high frequency component, 300 cps, to the low frequency component, 10 cps, of the scintillation signals derived using a telescope of 4-in aperture, to upper air winds as measured using GMD-1 rawinsonde equipment or CPS-10 radar equipment. The correlations lead to a relationship of the form $V = aR^b$, where V is the speed of the winds, a and b are constants, and R is the ratio of the 300 cps signal to the 10 cps signal. By using a rotatable 1x4-in slit a directional effect in the scintillation is found which correlates with the upper air wind direction. An analogue computer for determining the autocorrelation function of an electrical signal is described. The second technique utilizes the Optical Fourier Analyzer, which permits the direct measurement of the spatial power spectrum of a 2-dimensional function which is, or can be, represented by a 2-dimensional light pattern. The shadow band pattern associated with stellar scintillation is actually in motion with directions and speeds in the usual range of the upper air winds. The technique permits the direct determination of this velocity in units of m/sec. The pattern is continually changing, showing decay times which are measured in milliseconds. The spatial power spectra show that the usual pattern has elements with a characteristic size of the order of 15 cm on the average, but that the characteristic size can frequently be larger than this value, the actual size being indeterminate due to instrumental limitations. (Author)

Astrophysics

Aero-Space Labs., North American Aviation, Inc. [Downey, Calif.]
GEOPHYSICS AS APPLIED TO LUNAR EXPLORATION by J. Green. Final rept. on Contract AF 19(604)5886. 30 June 60, 280p. 262 refs. MD 59-277; AFCRL-TR-60-409; AD-245 513.
Order from LC mi$11.10, ph$42.60 PB 152 846

This report released for sale to the public 17 Jan 61.

Recent geophysical literature was applied to lunar exploration. Simple combinations of already existing hardware were prescribed to perform specific geophysical tasks on four vehicles. Experiments and surveys were discussed and described for use in hovering, surface, and subsurface probes. For the hovering and

surface surveys, certain morphological features of impacted and volcanic terrains were described. Emphasis was placed on caldera and lava plain features because of the advantages that volcanism offers over impact processes with regard to terrain and mineralization. Comparison curves of geophysical instruments over craters of the two opposing mechanisms of origin are compared. The two-curve magnetometer offers much in terrain analysis of the lunar surface. Instrumentation details of television and infrared surveying are detailed. A nested geophone and pulser define a possible system for both surface and subsurface seismic research. For surface and subsurface analysis, specific adaptations of conventional well logging devices, both horizontal and vertical, are outlined with emphasis on the search for water. Four instrumented vehicles, two hovering and two soft-landed, are described for the performance of specific missions. (Author)

High Altitude Observatory, Boulder, Colo.
HELIUM EQUILIBRIUM IN THE SOLAR ATMOSPHERE, by Hollis Johnson (Doctoral thesis). Scientific rept. no. 28 on Contract AF 19(604)2140. Sep 60, 69p. 110 refs. AFCRL TN-60-652.
Order from LC mi$3.90, ph$10.80 PB 152 946

Chap. I. Helium lines in the solar spectrum
Chap. II. The equilibrium of a radiating gas
Chap. III. Parametric solutions of the equilibrium equations for HeI
Chap. IV. A self-consistent solution for HeI
Chap. V. Temperature in the helium chromosphere
Chap. VI. Turbulence in the helium chromosphere

Lockheed Aircraft Corp., Sunnyvale, Calif.
DEVELOPMENT OF A COMPUTER SUBROUTINE FOR PLANETARY AND LUNAR POSITIONS, by Herman F. Michielsen and Martin A. Krop. Rept. on Contract AF 33(616)6638. Aug 60, 99p. 9 refs. LMSD rept. no. 311864; WADD Technical rept. 60-118.
Order from OTS $2.25 PB 171 196

Ephemerides of the nine major planets and the Moon, as obtained from the American Ephemeris and Nautical Almanac, are processed and converted into a format specifically tailored for use in space flight activities. The original degree of accuracy is maintained throughout. The information is given with respect to an inertial reference system, the Mean Equinox 1950.0, and expressed primarily in rectangular coordinates, although spherical coordinates are also obtained. The ephemerides are heliocentric for the planets and geocentric or heliocentric for the Moon. The report is an explanation and substantiation of the computer subroutines developed for usage in the IBM 709 or Remington Rand 1103AF computers. These subroutines determine, at the option of the user, either exact ephemerides or approximate positions. The former are only available for a limited period of time (presently 1960-1963). The latter are valid for many decades in the future and in the past. This approximate ephemeris is of sufficient accuracy to be used as a basis for the planning and design phases of a space flight project and, to a large extent for the determination of perturbations in actual flight plan analyses. (Author)

Maryland U., College Park.
DISTRIBUTION OF DENSITY IN A PLANETARY EXOSPHERE, PART II, SUPPLEMENT, by E. J. Opik and S. F. Singer. Rept. on Contract AF 19(604)3861. 14 Oct 60, 9p. 12 refs. GRD TN-60-606, suppl.
Order from LC mi$1.80, ph$1.80 PB 152 936

The approach and results obtained in a previous paper (GRD-TN-60-606, PB 149 952) are compared with those obtained by Chamberlain (Astrophys. J. 131, p. 47-56, 1960), by Johnson and Fish (Astrophys. J. 131, p. 502-515, 1960), and by Brandt and Chamberlain (Physics of Fluids 3, 485, 1960).

Minnesota U. School of Physics, Minneapolis.
BALLOON STUDY OF HIGH ALTITUDE RADIATIONS DURING THE INTERNATIONAL GEOPHYSICAL YEAR, by John R. Winckler. Rept. on 2.12 Cosmic Ray Intensity at High Altitude, Contract [Nonr-710(19)]. Mar 60, 69p. 38 refs. Technical rept. no. CR-26; AD-238 764.
Order from LC mi$3.90, ph$10.80 PB 148 494

Results of a series of 85 constant level balloon flights to measure cosmic rays and other types of radiation at high altitude are summarized. Each flight carried an ionization chamber, a Geiger counter, and nuclear emulsions, and remained at about 10 g/sq cm depth for times between 2 and 24 hr. The majority of flights were made at Minneapolis, Minn. The large decrease in primary cosmic ray intensity between 1956 and 1958 was observed at high altitude. The high altitude measurements correlate with sea level neutron instruments. Many special events were detected, including x-rays produced by electrons incident on the atmosphere during strong aurorae and solar cosmic rays detected on 10 occasions and correlating with other known observations made in the polar regions. In one case γ-rays originating on the solar surface were detected in a short burst. Several cases of radioactive layers in the atmosphere at low level resulting from nuclear explosions were found. (Author)

Minnesota U. School of Physics, Minneapolis.
OBSERVATIONS OF THE VAN ALLEN RADIATION REGIONS DURING AUGUST AND SEPTEMBER 1959, PART I, by R. L. Arnoldy, R. A. Hoffman and J. R. Winckler. Rept. on Cosmic Ray Program, Contract NASw-56. Mar 60, 41p. 13 refs. Technical rept. no. CR 25; AD-235 804.
Order from LC mi$3.30, ph$7.80 PB 149 645

An integrating ionization chamber and a single Geiger counter were flown on U. S. satellite Explorer VI in an elliptical orbit extending to 48,000 km. In addition to the Van Allen inner zone and the great outer zone, a stable and distinct intermediate zone was detected throughout August and September 1959. The outer zone intensity showed a large decrease following the sudden commencement of a geomagnetic storm. Later in the storm the outer zone increased to much in excess of its pre-storm level. During stable periods the outer zone was fairly constant and less intense than observed with Pioneer III or Pioneer IV on the first Soviet cosmic rocket. Cosmic ray background counting rates were reached on most passes in August and September near apogee of the satellite. The radiation dumped from the

outer zone during the geomagnetic storm fits very well with the intensity and latitude distribution required to account for balloon observations of auroral x-rays made during the IGY period. (Author)

Minnesota U. School of Physics, Minneapolis.
STANDARDIZATION OF IONIZATION CHAMBERS, by R. A. Hoffman. Rept. on 2.12 Cosmic Ray Intensity at High Altitude, Contract [Nonr-710(19)]. Mar 60, 45p. 26 refs. Technical rept. CR-27; AD-238 765.
Order from LC mi$3.30, ph$7.80 PB 148 495

Introduction: time variations of cosmic rays: brief description of instruments; measurement of the energy flux. Methods of standardization of the chambers: calibration of charge per pulse: electrometer amplifier, calibration of the condenser, three calibration methods, discussion of the calibration; Co^{60} gamma calibration: normalization factor, constant current from Co^{60} source, other corrections; results and errors. Continuous current chamber: construction; current under the Co^{60} source. Application to balloon flights: normalized charge/pulse; normalized rate of ionization; example data. Intercomparison of results with H. V. Neher.

New Mexico State U., University Park.
HEAVY NUCLEI COMPONENT OF THE COSMIC RADIATION AT BALLOON ALTITUDES, by Robert E. McDaniel. Rept. on Contract AF 29(600)2025. Sep 60, 26p. 10 refs. AFMDC TR-60-28.
Order from LC mi$2.70, ph$4.80 PB 152 968

Nuclear emulsions were exposed to the cosmic radiation on high altitude balloon flights from a geomagnetic latitude of approximately 55°N and were examined for tracks of nuclei of charge greater than or equal to 6. These tracks were analyzed for charge and energy distribution. The tracks caused by nuclei of energy greater than approximately 800 Mev/nucleon were identified by a combination of gap density and delta-ray density measurements. Tracks of energy less than 800 Mev/nucleon had their energy and charge determined by the variation of delta-ray density with range. The nuclei were divided into three charge groups: $M(6 \leq Z < 10)$, $H(Z \geq 10)$, $VH(Z \geq 20)$. The flux observed on Flight 1 was 8.2 ± 1.6 particles/m^2/sec/Sr and the M/H and M/VH ratios were 2.4 ± 0.6 and 10.3 ± 2.6, respectively. The charge and energy of the low energy tracks were tabulated. The average flux observed on Flight 2 was 7.9 ± 2.0 particles/m^2/sec/Sr and the M/H and M/VH ratios were 3.2 ± 0.8 and 15.5 ± 4.0 respectively. (Author)

Ohio State U. Research Foundation, Columbus.
STUDY OF LUMINOSITIES OF LONG-PERIOD VARIABLES [AND] ABSOLUTE MAGNITUDE OF THE MIRA VARIABLE X MONOCEROTIS, by Philip C. Keenan. Final rept. for 1 Oct 58-31 Dec 59, Contract Nonr-2530(00). Feb 60, 9p. Rept. 823-1; AD-236 460.
Order from LC mi$1.80, ph$1.80 PB 152 171

A two-dimensional classification was extended to more than 50 Mira variables. The need for some independent calibration of the classification in luminosity led to the study of the interstellar D-lines in the variables of high velocity. Individual absolute magnitudes are available for only 2 Mira variables (X Oph and X Mon) in the northern sky, but the agreement of their values with statistical means lends support to the conclusion that the majority of these stars have visual absolute magnitudes near -0.5 to -1.0 at maximum light. The classification suggests that there are a few of higher luminosity that could be termed supergiant variables. (Author)

[Yerkes Observatory, Williams Bay, Wis.]
NAVY WIDE PHOTO GUIDE RESEARCH, by Helmut A. Abt. Final rept. on Contract N6ori-02054. 10 July 59, 1p.
Order from LC mi$1.80, ph$1.80 PB 153 278

BEHAVIORAL SCIENCES

Human Engineering

Dunlap and Associates, Inc., Stamford, Conn.
TRACKING TRAINING IV: DESIGN AND UTILIZATION OF THE GENERAL VEHICULAR TRAINER, by Hugh M. Bowen. Charles R. Kelley and Jerome H. Ely. Rept. on Contract Nonr-1908(00). 29 Aug 60, 59p. 5 refs. Technical rept. NAVTRADEVCEN 1908-00-4.
Order from LC mi$3.60, ph$9.30 PB 150 317

A design of a General Vehicular Trainer (GVT) is given in detail. The trainer is designed to accomplish the preliminary training in vehicular control for trainees who are in the early stages of training courses for pilots, submarine helmsmen/planesmen, surface ship helmsmen, land vehicle drivers, etc. The major characteristics of the GVT are: simulation of forward movement through space as shown by an instrument panel displaying vehicle motions and states in the vertical and horizontal dimensions; simple and inexpensive construction; variable dynamic characteristics (lags, stability, responsiveness, speed, etc.) able to resemble a wide range of vehicular systems; integral scoring circuits providing knowledge of results. Recommendations concerning utilization practice and the design of a field evaluation test are given. An experiment is reported which compared nine methods of scoring. The nine methods all used the integral of absolute error measure but had different dead-bands (no error accumulated when deviation is $\pm$ x volts from zero) and different time delays (the scoring started t seconds after the start of the problem). It was concluded that no advantage is to be gained from employing any dead-band or any time delay. A discussion of the major recommendations arising from the series of studies (of which this is the fourth) concludes the report. (Author) (See also PB 146 878)

Rowland and Co., Haddonfield, N. J.
A METHOD OF MAKING DIMENSIONAL MEASUREMENTS OF COMPLEX MOTIONS, by George E. Rowland and Charles E. Kulp. Rept. on Contract Nonr-2856(00). 31 Mar 60, 65p. 10 refs. R & C rept. #60-1-2; AD-240 350.
Order from LC mi$3.90, ph$10.80 PB 149 211

Using the method described, determination can be made of the four dimensional coordinates of any given point of interest. This is accomplished through adjusting the image size of a one-camera motion picture photographic view of a sphere so that it is reconstituted in actual size. This restoration of correct projection size simultaneously solves all the problems of parallax which have previously blocked practical photographic measurements of this kind. Use of the method permits photographic recording and resultant readout of the envelope of space required for the execution of complex motions. Processed data portraying the exterior dimensions of the total space envelopes required by the human for certain tasks are presented. Although the technique has been demonstrated using human biomechanical motions, there is no apparent reason why the technique could not be applied to mechanical motions in general.

Personnel and Training

American Inst. for Research [Pittsburgh, Pa.]
AFFECTIVE AND ACCEPTANCE FACTORS IN SELECTION AND UTILIZATION OF TRAINING AIDS AND DEVICES, by Armand N. Chambers. Rept. on Contract N61339-97. 26 Nov 58, 53p. Technical rept. NAVTRADEVCEN 9-11-1; AD-214 729.
Order from LC mi$3.60, ph$9.30 PB 149 642

An attempt was made to identify some of the factors other than training value which influence the choice among available training aids, the amount of utilization of various training aids, and the writing of requirements for training aids by instructional personnel and training supervisors. Individual interviews were conducted with 21 instructors and 24 other personnel concerned with Naval training where transparencies, animated panels, models, cutaways, and mockups are in use. Data indicated that instructors prefer aids which embody realism, are readily procured, avoid distraction, and provide flexibility. They rate highly the ability of a training aid to provide variety. To meet these criteria, they prefer operational equipment, transparencies, charts, and animated schematics. They neither like nor use equipment panels. Films and photographs also rank low in their choice. Training aids and devices were believed essential to classroom teaching.

American Inst. for Research, Pittsburgh, Pa.
A SURVEY OF CUEING METHODS IN EDUCATION AND IN AUTOMATED PROGRAMS, by Leslie J. Briggs. Rept. on Contract AF 49(638)681. May 60, 44p. 14 refs. Research rept. AIR-314-60-IR-106; AFOSR TN-60-286; AD-238 967.
Order from LC mi$3.30, ph$7.80 PB 153 460

This report released for sale to the public 18 Jan 61.

This report discusses methods used by teachers and writers of auto-instructional programs in cueing or prompting students to maximize the likelihood of their giving the correct responses to instructional exercises. The use of direct prompts versus less direct forms of cueing is discussed and illustrated. The relative absence of evidence on cueing technique from studies in the experimental laboratory is noted. Teacher techniques in starting with minimal cueing and proceeding to more direct prompts are pointed out, and prompting features of some training devices are described. Crowder's intrinsic programming method is discussed from the standpoint of cueing. Specific cueing techniques used in "Skinner-type" programs by Holland and others are illustrated and briefly commented on. (Author)

Behavioral Sciences Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
A BIBLIOGRAPHY OF AEROSPACE MEDICAL DIVISION REPORTS IN THE FIELDS OF ENGINEERING PSYCHOLOGY AND TRAINING PSYCHOLOGY, 1945-1960, comp. by Sandra A. Stevenson. May 60, 53p. 508 refs. AD-243 253.
Order from OTS $1.50 PB 171 332

A complete bibliography of the Memorandum Report, Technical Report and Technical Note publications of the Engineering Psychology Branch and the Training Psychology Branch is presented. This bibliography includes all published reports resulting from contract and in-house research from 1945 to 1960. There were additional reports emanating from the Psychology Branches which were published in open professional journals. These reports were not included in this bibliography. The references are grouped by functional or subject-matter areas. Within an area, the references are listed alphabetically using the authors' names. In addition, in the Index, the reports are referenced by author and by report number. (Author)

Dunlap and Associates, Inc., Stamford, Conn.
RECENT INNOVATIONS IN METHODOLOGY FOR TRAINING AND TRAINING RESEARCH, by Alfred F. Smode and Kenneth W. Yarnold. Rept. on Contract Nonr-2490(00). Mar 60, 92p. 202 refs. AD-235 806.
Order from LC mi$5.40, ph$15.30 PB 147 305

Contents:
New ways of determining the requirement for training
Procedures for the analysis of task requirements
New ways of providing learning experience
Types of problems or tasks
Complex devices that provide opportunities for system training
Establishing and/or controlling the working environment
New ways of measuring the progress and outcomes of training
Observing and recording force activity behavior
Scoring and recording devices
Motor skill scoring
Analyzing data from learning studies
New ways of providing knowledge of results
Information feedback as a factor in learning
Motivational aspects
Knowledge of results and reinforcement

Educational Research Corp. [Cambridge, Mass.]
STABILITY OF INTEREST MEASURES AND THEIR VALIDATION FOR SELECTION AND CLASSIFICATION, by R. F. Schweiker. Rept. on Contract AF 18(600)1358. May 59, 55p. 2 refs. WADC-TR-59-36; AD-215 482.
Order from LC mi$3.60, ph$9.30 PB 153 631

This report released for sale to the public 10 Jan 61.

To determine the suitability of interest measures for Air Force personnel procedures, two multiple-scale interest measures, Activity Preference Report and Opinion Inventory, were given to 16,665 recruits entering the Air Force, to 1,465 of the initially-tested airmen near the completion basic training, and to 1,043 of the initially-tested airmen when completing technical school for one of five selected career fields. Career Preference Items and a Reenlistment Intent Item were given in the first two testings and measures of satisfaction with the career field and the Air Force were given in the third testing. Technical school grades and aptitude indexes were obtained for the airmen in the third testing. The interest measures and the Reenlistment Intent Item indicated difference among groups at the three basic training bases and among groups later assigned to the five career fields. They also indicated that some changes occur during basic training and technical school training. In a multiple regression analysis, the interest measures did not provide useful prediction of school success, reenlistment intent, or other indications of career satisfaction. They are accurately measuring something of importance, but additional analyses are necessary to determine how this information can best be used by the Air Force. (Author)

Human Resources Research Office, George Washington U., Washington, D. C.
A FOLLOW-UP STUDY OF EXPERIMENTALLY AND CONVENTIONALLY TRAINED FIELD RADIO REPAIRMEN, by George H. Brown and Robert Vineberg. Rept. on Contract DA 49-106-qm-1. Sep 60, 33p. 3 refs. Technical rept. 65; AD-245 468.
Order from LC mi$3.00, ph$6.30 PB 152 788

Approximately 70 graduates each of an experimental an a conventional Field Radio Repair course were recontacted after about nine months' field experience to determine their relative proficiency at that time. The experimental course had emphasized recognition and correction of the most common troubles in the most frequently repaired items of equipment and provided the repairman with a systematic trouble shooting procedure; it also incorporated "Functional Context Training" which featured, for example, presentation of theoretica material in a maintenance-oriented context. The exper mental course had produced graduates who were markedly superior to the standard course graduates at the time of graduation. At the time of retesting, the twc groups of graduates were substantially equivalent in their repair proficiency. It is concluded that although the instruction received by the experimental graduates was less oriented toward theory than was the standard instruction, this did not place the experimental subjects at any disadvantage as compared with the standard graduates. (Author)

Human Resources Research Office, George Washington U., Washington, D. C.
ON-SITE TRAINING OF GUIDED MISSILE OPERATORS, by Myron Woolman. Rept. on Contract DA 39-106-qm-1. Aug 60, 148p. 9 refs. Technical rept. 64 and Suppl.; AD-244 250.
Order from LC mi$7.20, ph$22.80 PB 152 580

The study was concerned with developing and testing a method of training Nike IFC operators on site. In a five-month field test, three experimental methods were compared with conventional training. The principal experimental method--Operational Context Training (OCT)--was incorporated in a Training Guide that included (1) a step-by-step breakdown of all operator procedures, (2) specific instructional techniques for use by battery personnel without experience as instructors, and (3) a systematic method of evaluating trainees. Operators trained by the various methods were compared by means of job-sample and written criterion tests, and by other measures. Operators trained by the OCT method were more proficient than those trained by the other methods in the study; OCT-trained operators were as proficient as school-trained personnel with greater on-site experience. (Author)

Naval Personnel Research Field Activity, San Diego, Calif.
A FOLLOW-UP ANALYSIS OF THE NEW COMPOSITE SYSTEM FOR SELECTING NROTC REGULAR STUDENTS, by Bernard Rimland. Mar 60, 16p. 3 refs. BuPers Technical Bulletin 60-8; AD-244 663.
Order from LC mi$2.40, ph$3.30 PB 152 626

An analysis was made of test scores and other information from the application files of 300 men chosen to represent a random sample of applicants to the 1959 NROTC Regular Program. By comparing the scores on the several selection instruments for the "selected" group of 100 with the scores for the "non-selected" group of 200, it was possible to assess the extent to which each instrument had been used by the committees in making selections. The analysis showed that the new selection procedures, though optional, had been widely adopted by the State Selection Committees. Some 80 per cent of the application files carried the new Academic and Career Composite scores recommended as part of the new procedures. A newly developed scale for facilitating the use of interviewer judgements of career motivation made a significant positive contribution to the 1959 selection program. Also in line with the new recommendations, the overall interviewer's rating of the applicant, heavily overweighted by the Selection Committees in previous years, was given a more moderate and appropriate place in the selection program. The new selection procedures are considered to be making a substantial improvement in the quality of input to the NROTC program and should be continued in use. (Author)

Personnel Lab., Wright Air Development Div., Lackland AFB, Tex.
DEVELOPMENT OF SPECIALITY OUTLINES FOR COLLECTING JOB INFORMATION IN THE RADIO-RADAR SYSTEMS CAREER FIELD, by Gordon E. Cowan. Aug 60, 24p. 3 refs. WADD-TN-60-213; AD-243 826.
Order from LC mi$2.70, ph$4.80 PB 152 783

A study was made to investigate the feasibility of using an instrument with standard functional work categories to collect occupational information across different specialties of a maintenance career field and at two skill levels. Specialty Outlines were developed for the 5- and 7-skill level for six AFSCs in the Radio-Radar Systems career field and administered to teams of pro ficient NCO incumbents. The 7-level outlines were administered twice with a five-week interval and the 5-level outlines were administered once. Analysis of variance techniques were applied to estimates of the percentage of time spent on each of 13 standard functional work categories. Each team of specialists was interviewed to discuss the content and format of the outline for their AFSC. Results of the analyses and interviews indfcate that Specialty Outlines using standard functional work categories are (1) reliable instruments, (2) adequate for use across different AFSCs of a maintenance career field at both the 5- and 7-level, and (3) differentiate between the work activities of 5- and 7-level airmen. (Author)

Personnel Lab., Wright Air Development Div., Lackland AFB, Tex.
FACTOR ANALYSIS OF WAF PEER NOMINATIONS, by Lois Lawrence Elliott. Sep 60, 15p. 5 refs. WADD TN-60-217.
Order from LC mi$2.40, ph$3.30 PB 153 506

A factor analysis of the intercorrelations of 30 peer nomination variables, aptitude, age, and success or failure for WAF in basic training yielded seven factors. The three major factors represented dimensions of leadership, heterosexual adjustment, and agreeableness. The remaining dimensions were motivation, emotional maturity, neatness, and feminine interests. (Author)

Personnel Lab. [Wright Air Development Div.] Lackland AFB, Tex.
PSYCHOLOGICAL TESTS AND THE SELECTION AND CLASSIFICATION OF AIR FORCE OFFICERS, by Ernest C. Tupes and Raymond E. Christal. Apr 57, 21p. 75 refs. Development rept. AFPTRC-TN-57-52; AD-126 383.
Order from LC mi$2.70, ph$4.80 PB 153 572

This report released for sale to the public 4 Jan 61.

Aptitude tests have proved highly effective as a means of selecting officer personnel. They are generally usec in officer selection programs but are not yet fully exploited in officer classification. As appropriate instruments are developed, wider use can be made of aptitude tests in the classification of officers. Development of motivation and personality tests related to proficiency in specific job areas may increase precision of officer classification and, perhaps, add to the effectiveness of officer selection programs.

Tennessee U., Knoxville.
DIMENSIONS OF AIRMAN MORALE, by Edward E. Cureton. Rept. on Contract AF 41(657)247. June 60, 75p. 10 refs. WADD TN-60-137.
Order from LC mi$4.50, ph$12.30 PB 153 271

In an attempt to determine and measure aspects of airman morale, 167 questionnaire items were assembled and administered to a thousand airmen. By cluster and factor-analytic techniques, eight scales were derived, one of them defined as a measure of General Morale. Three of the scales are fairly independent of each other, but closely related to the General Morale Scale: satisfaction with the Air Force as a Whole, with Management and Communication, and with the Unit and its Leadership. The remaining four scales are relatively independent of all other scales: satisfaction with the Immediate Supervisor, with the Air Force as a Military Organization, with the Job, and with the Civilian Community. The Supervision scale is the only one clearly defined as measuring a uniquely identified facet of morale. For the other scales, a different approach in the analysis could yield another equally defensible set. Technical appendixes give the analytical and statistical detail. (Author)

Psychology

Adjutant General's Office, Washington, D. C.
SYSTEMS RESEARCH--OPPORTUNITY AND CHALLENGE FOR THE MEASUREMENT RESEARCH PSYCHOLOGIST, by Julius E. Uhlaner. July 60, 17p. 5 refs. PRB Technical research note 108. AD-244 856.
Order from LC mi$2.40, ph$3.30 PB 152 757

Systems research is examined from the point of view of the human factors research scientist dealing with military problems. The measurement research psychologist can use the systems approach to advantage, particularly where the objective is improvement of a total operation through optimal balance of critical factors. At the same time, he is in a position to influence development of systems research methodology, contributing design and techniques for such objectives as identification and definition of critical factors and the development of a common metric with which to evaluate man and machine performance. A suggested framework for human factors oriented systems research is organized around three basic elements: (1) systems components to be studied (independent variables), (2) output or performance (dependent variables), and (3) conditions or environment in which the system operates. (Author)

Adjutant General's Office, Washington, D. C.
VALIDATION OF COMMON CORE PATTERN ANALYSIS AND MECHANICAL KNOWLEDGE TESTS FOR MECHANICAL MAINTENANCE COURSES, by William H. Helme, James B. Trump and David J. Fitch. July 60, 20p. 4 refs. PRB Technical research note 107; AD-244 855.
Order from LC mi$2.40, ph$3.30 PB 152 756

Two experimental tests, Pattern Analysis and Mechanical Knowledge, developed under a joint Armed Services program to provide common core classification tests, were evaluated for Army use in classification to three mechanical areas. The experimental common core PA was less effective than the operational PA, both singly and in combination with other Army Classification Battery tests. The Mechanical Knowledge Test

was a promising predictor, particularly for motor maintenance jobs. Definitive evaluation of MK suitability for the ACB requires validation for additional mechanical areas, as well as comparison with other measures under development to improve differential classification within the mechanical domain. (Author)

Air Force Missile Development Center, Holloman AFB, N. Mex.
COMPLEX AVOIDANCE BEHAVIOR IN THE CHIMPANZEE AND ITS APPLICABILITY TO THE STUDY OF SPACE ENVIRONMENTS, by Richard E. Belleville, Frederick H. Rohles, Jr. and others. Sep 60, 20p. 10 refs. AFMDC-TR-60-27.
Order from LC mi$2.40, ph$3.30 PB 152 744

This report describes the concurrent development of two types of avoidance behavior in the chimpanzee in which a discrete avoidance task was super-imposed on a schedule requiring continuous avoidance behavior. The rationale for using these tasks for measuring the behavioral effects of space flight is presented. (Author)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
SOME FACTORS IN THE EMOTIONAL ADJUSTMENT OF RADAR OBSERVERS IN JET FIGHTER INTERCEPTOR AIRCRAFT, by Joseph J. Reidy and Horace F. Drury. Nov 53, 9p. Proj. no. 22-1201-0000, Special rept. no. 1.
Order from LC mi$1.80, ph$1.80 PB 153 325

The permanent assignment of each radar observer to a specific pilot was an important factor in the significantly better adjustment of the second group. The always desirable screening for size and body build in relation to aircraft crew space in the selection of radar observers is particularly important in climates where heavy clothing must be worn for survival following crash landing or bail-out and where accessory survival equipment must be carried attached to the parachute during flight. Although the severe cold climate of the theater appeared to have no effect per se on the results noted, the bulkiness of the clothing required and the resulting impairment of motion, excessive time required for dressing and the inconvenience of having to wear much of the clothing for long periods on the ground while on standby for alerts were constant sources of annoyance and complaints.

Aviation Psychology Lab., U. of Illinois, Urbana.
ISSUES IN THE USE OF AN ANALOG-DIGITAL DATA SYSTEM FOR THE MEASUREMENT OF TRACKING BEHAVIOR, by Carl E. Webber and Jack A. Adams. Technical note on Contract AF 49(638)371. Apr 60, 38p. 6 refs. AFOSR-TN-59-528; AD-245 064.
Order from LC mi$3.00, ph$6.30 PB 152 703

Tracking data collected by an analog-digital data system and processed with a digital computer is recommended as a solution for certain research restraints imposed by the traditional methods of measuring tracking behavior. An experiment on system parameters performed entirely on a digital computer, evaluated sampling rate and number of digits per reading of simulated tracking error functions for time on target measures. The Sampling Theorem recommending a sampling rate twice that of the highest component frequency in the analog signal is sound for time on target computations, but somewhat lower rates appear acceptable for many applications. Empirical tracking data obtained with an analog-digital data system is presented. (Author)

Behavioral Sciences Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
JUDGMENTS OF THE RELATIVE FREQUENCY OF TWO RANDOM SEQUENTIAL EVENTS: EFFECTS OF DURATION OF OBSERVATION, by Dwight E. Erlick. Rept. on Design Requirements for Decision-Making Displays. Sep 60, 10p. 1 ref. WADD Technical rept. 60-673.
Order from OTS $0.50 PB 171 313

The purpose of this investigation was to determine the effect that duration of observation has on one's ability to tell which of two random sequential events has occurred more frequently. Using a rate of four events per second and observation durations ranging from 1.75 to 80 seconds, two specific conditions were studied: (1) the effect of having a constant observation period repeated so that Ss could anticipate the duration of each observation, and (2) the effect of having a highly variable observation time such that the observer could not accurately anticipate when the time sample would end. Using 75 per cent correct identification of the more frequent event as a threshold measure, the results indicate, for both presentation conditions, that a smaller increment in frequency of one of the events over the other was needed as the observation duration increased. An asymptote was reached as the ratio between the more frequent and the less frequent event approached 1.20. With a constant observation time, the asymptote is reached between 10 and 20 seconds duration, while with a variable observation time, it is reached between 40 and 80 seconds. (Author)

Hughes Aircraft Co., Culver City, Calif.
OPERATOR PERFORMANCE IN STRIKE RECONNAISSANCE, by A. C. Williams, Jr., C. W. Simon and others. Rept. on Human Performance in Advanced Systems, Contract AF 18(600)1798. Aug 60, 81p. 137 refs. WADD Technical rept. 60-521.
Order from LC mi$4.80, ph$13.80 PB 153 387

The purpose, requirements, and constraints of the tactical strike-reconnaissance mission are analyzed. The properties and applications of various sensors and their associated displays, the operator's task, variables affecting his performance, and the operator himself were all considered in this analysis. Two experimental studies were conducted. The first was a clinical investigation of the effects of variations in display resolution and scale factor upon operator performance in target identification. The second was a quantitative experiment to determine the feasibility of predicting the identifiability of targets on the basis of their visible physical attributes revealed at various display resolutions. The results suggest that such predictions are possible. A bibliography of studies related to this area is appended. (Author)

Human Factors Research, Inc., Los Angeles, Calif.
A STUDY OF INDIVIDUAL DIFFERENCES IN VIGILANCE PERFORMANCE, by Donald N. Buckner, Albert Harabedian, and James J. McGrath. Technical rept. no. 2 on Human Factor Problems in Anti-Submarine Warfare, Contract Nonr-2649(00). Jan 60, 50p. 15 refs. AD-231 897.
Order from LC mi$3.30, ph$7.80 PB 152 888

The statistical and practical significance of individual differences between sonar operators in vigilance performance, and the reliability of individual differences both within a watch and from one watch to the next were determined. The relationship between the performances of the same individuals under alerted and ordinary watch standing conditions was also investigated. Fifty-four men stood 2 one-hour watches a day, 4 days a week, for 4 weeks. Half of the watches were on a visual and half on an auditory vigilance task, and the men were required to detect brightness or loudness differences. A rapid decrement in detection performance occurred between the pretest (alerted condition) and the beginning of the watch. This decrement probably did not reflect a loss in the men's capacity to detect the signals since performance returned abruptly and completely to the pretest level on the posttest. Rather, it probably reflected a difference in the men's set toward the tests as opposed to the watches. Individual differences became larger as the watch progressed, and were reliable both within a given watch and from one watch to the next. About 75% of the decrement in performance during the watches occurred within the first 20 min. Men who were visually and aurally more sensitive performed the sonar detection task better.

Lincoln Lab., Mass. Inst. of Tech., Lexington.
EXTENDING THE SUCCESSIVE INTERVALS MODEL TO THE MULTIDIMENSIONAL CASE, by William P. Harris. Rept. on Contract AF 19(604)7400. 14 Oct 60, 12p. 2 refs. 58G-0015; AD-244 679.
Order from LC mi$2.40, ph$3.30 PB 152 621

It is shown how Thurstone's Successive Intervals method may be extended to multidimensional data when the subject responds to several attributes of a stimulus on each trial. The method requires that the subject make simultaneous judgments about N attributes of each stimulus in two or more categories per attribute. The model says that the apparent magnitudes of the attributes vary from trial-to-trial in an N-dimensional multivariate normal distribution. This extension of the successive intervals model to many dimensions holds promise to uncover some judgmental aspects of pattern recognition behavior -- certainly more so than other psychophysical methods.

Ohio State U. Research Foundation, Columbus.
ORIGINALITY IN GROUP PRODUCTIVITY. I. PRODUCTIVE INDEPENDENCE IN THREE NATURAL SITUATIONS, by Pauline N. Pepinsky. Rept. on Contract Nonr-495(15). 1959, 145p. 48 refs. AD-231 067.
Order from LC mi$7.20, ph$22.80 PB 152 913

Contents:
Productive independence on a university campus
Productive independence in a research institute
Productive independence in an architecturally planned neighborhood
A conceptual transition to the laboratory

Personnel Lab., Wright Air Development Div., Lackland AFB, Tex.
A REVIEW OF SOME LITERATURE ON JUDGMENT WITH IMPLICATIONS FOR JOB EVALUATION, by Joseph M. Madden. Aug 60, 16p. 31 refs. WADD-TN-60-212.
Order from LC mi$2.40, ph$3.30 PB 153 110

Job evaluation has been described as a psychological process closely resembling those which have been subjected to experimentation both in the laboratory and in practical situations. It is based on the psychophysical method of single stimuli. Predictions from previous research indicate that the evaluation a job receives is most reliable when it is judged in a group with other jobs, and that the composition of this group influences the evaluation it receives. If the presence of these context effects in job evaluation is verified, the next step is to design an adequate procedure for their control. Determination of the optimal method of representing the job to the rater and an examination of the effects of residual factors, such as familiarity of the rater with the job being rated, may also suggest changes in current job evaluation procedures. All of these phenomena should be considered in their relationship to Air Force job-evaluation procedures. (Author)

Psychological Lab., U. of Southern California [Los Angeles].
A FACTOR-ANALYTIC STUDY OF PROBLEM-SOLVING ABILITIES, by P. R. Merrifield, J. P. Guilford and others. Rept. no. 22 on Studies of Aptitudes of High-Level Personnel, Contract [N6onr-238(10)]. Mar 60, 31p. 24 refs. AD-237 752.
Order from LC mi$3.00, ph$6.30 PB 148 004

A modified theory of problem solving was developed, involving five phases: preparation, analysis, production, verification, and reapplication. The study was limited to six hypothetical component abilities, all emphasizing aspects of the production phase. Tests and problems were restricted to the semantic or verbal category. Twelve new tests were developed to investigate the hypothesized abilities. Three additional new tests were developed for use as criteria of success in problem solving. They present problems in which the solver's general task is to start with situational information and goal information and to bridge the gap between the two. Eighteen marker tests of previously known factors were included in the test battery. Ten rotated factors were identified as previously known dimensions, and a new factor was identified as convergent production of semantic classes. The criterion (problem-solving) tests had significant loadings on one or more of four factors, all previously known. The kind of test that seems most related to the criterion tests was designed to measure abilities to work from goal information. This suggests that the development of a search model or anticipatory schema plays an important role in solving problems of the kind included in this study. There was no evidence of a unitary problem-solving ability. Since much of the variances

of the problem-solving tests could be accounted for in terms of known factors and no new factors seemed to be needed, the hypothesis that problem solving can be accounted for in terms of factors in the structure of intellect appears to be promising. (Author)

Rutgers State U., New Brunswick, N. J.
HOMEOSTASIS THEORY OF SMALL GROUPS. IV. LIGHT MANUFACTURING PERSONNEL, by F. K. Berrien and William H. Angoff. Technical rept. no. 6 on Contract Nonr-404(10). Jan 60, 60p. AD-232 743.
Order from LC mi$3.60, ph$9.30 PB 152 889

Selected employees of two plants, A and B, manufacturing identical items on machines of nearly the same design were respondents to a Likert-type attitude questionnaire on two occasions separated by three and a half months. One week prior to the second survey, employees of Plant B were informed the plant would be moved to a distant location. It was hypothesized that if measures of Group Need Satisfactions remained essentially unchanged on the second survey in Plant B, compensatory adjustments would occur among variables predicting G.N.S. Results showed that G.N.S. did in fact remain unchanged in both plants. Few statistically significant changes occurred among the predictor variables, and none occurred that could be satisfactorily interpreted within the framework of the homeostasis theory. It is concluded that future research should be directed toward the discovery of conditions that influence the level of G.N.S. which is tentatively conceived as akin to a perceptual constancy. (Author)
(See also PB 148 268)

School of Aviation Medicine, Brooks AFB, Tex.
PSYCHIATRY AND SPACE FLIGHT, by Bernard E. Flaherty, Don E. Flinn and others. Sep 60, 10p. 23 refs. AFSAM rept. no. 60-80.
Order from LC mi$1.80, ph$1.80 PB 152 764

This paper discusses some of the emotional hazards that can be anticipated and their possible effect. Since these psychologic stresses are intimately related to the threatening environmental stresses, it seems worthwhile to review these factors at the outset.

Stockholm U. (Sweden).
A SIMPLE METHOD FOR FITTING PSYCHOPHYSICAL POWER FUNCTIONS, by Gösta Ekman. Technical (scientific) note no. 1 on Contract AF 61(052)300. 26 May 60, 8p. 7 refs. AFOSR-TN-60-1085.
Order from LC mi$1.80, ph$1.80 PB 152 535

A method is described for fitting psychophysical power functions of the form $c(S-a)^n$ to subjective scale values on the ratio level. If the stimulus constant a is negligible, the method may be used for fitting the function to a subjective interval scale and locating the absolute zero point of this scale. (Author)

Tennessee U., Knoxville.
THE STATUS OF MORALE MEASUREMENT, 1959, by Gerald H. Whitlock. Rept. on Contract AF 41(657)247. May 60, 33p. 73 refs. WADD-TN-60-136; AD-243 825.
Order from LC mi$3.00, ph$6.30 PB 152 782

This review and critical analysis of attempts at morale measurement presents the first phase of an investigation aimed at developing an effective means for measuring morale among Air Force personnel. The uses of morale measures as predictors and as criteria are noted, and the implications of each usage for measurement are discussed. The problem of scale dimensionality is analyzed, and studies are cited demonstrating the confusion resulting from erroneous assumptions of unidimensionality. An analysis of low intercorrelations among diverse morale measures emphasizes notions of dimensional relevance and concept relevance. A review of definitions of morale points out such problems as the equating of job satisfaction and morale, individual and group references, and definitions for which no measurement operations presently exist. The collection of methodologies and conceptualizations which, in effect, constitute the body of morale theory, is reviewed with particular attention to conclusions drawn from factor analysis. These results give a basis for a more exact and complete analysis of the dimensions of Air Force morale. (Author)

BIOLOGICAL SCIENCES

Anatomy and Physiology

Aerospace Medical [Div.] Wright Air Development Div., Wright-Patterson AFB, Ohio.
BIBLIOGRAPHY ON AEROMEDICAL RESEARCH WITH ABSTRACTS, ed. by Joan C. Robinette. Dec 59, 107p. 315 refs.
Order from OTS $2.50 PB 171 333

The major areas comprising the Laboratory's mission are behavioral sciences, biomedical sciences, and engineering as related to human factors in aircraft design and survival equipment. The reports documenting the first two areas are subdivided into more specialized categories: engineering psychology, training psychology, bioacoustics, biophysics, and physiology.

Arctic Aeromedical Lab., Ladd AFB, Alaska.
BODY HEAT PRODUCTION AND SURFACE TEMPERATURES IN RESPONSE TO A COLD STIMULUS, by John P. Meehan. Jan 55, 14p. 10 refs. Proj. no. 7-7951, rept. no. 2.
Order from LC mi$2.40, ph$3.30 PB 153 336

Metabolic rates were simultaneously measured with multiple surface and deep body temperatures on an experimental group of Alaskan native subjects and a control group of Caucasian military personnel during a standard exposure in a cold room. The initial or basal metabolic rates of all of the subjects were found to be at normal accepted values. The native subjects did not have an elevated basal rate. On exposure to cold, the native subjects showed the greater increase in metabolic rate. This increase was due to greater shivering on the part of the natives. During the cold exposure, the native subjects kept their hands and feet warmer than did the control subjects. Trunk skin temperatures and mean body temperatures for the two subject groups were not significantly different. The control group developed the greater total loss of body heat. (Author)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
COMPARATIVE SWEAT RATES OF ESKIMOS AND CAUCASIANS UNDER CONTROLLED CONDITIONS, by Kaare Rodahl and Donald W. Rennie. Mar 57, 21p. 16 refs. Proj. no. 8-7951, rept. no. 7.
Order from LC mi$2.70, ph$4.80 PB 153 341

Comparative sweat rates and metabolic rates were measured in Eskimos and Whites under three separate conditions. The evidence indicated a greater heat production in the Eskimo group at rest and during standard comparative exercises. In the "comfort zone" and under conditions favoring body heat storage, the Eskimos responded by sweat activity which was greater than the Whites' and which was in proportion to their increased heat production. Body heat debt and heat storage under the above conditions were the same for both groups, which indicated that the thermoregulatory "set" of the Eskimo was the same as for the White. The average skin temperature of the Eskimo did tend to be elevated above the Whites' at all environmental temperatures below 35° C. A high correlation existed between the average skin temperature and sweat rates of both the Eskimo and White groups, and the frequency-distribution of the data was the same for both. The fundamental difference in the groups from the standpoint of thermal regulation appears to center upon the increased metabolism of the Eskimo.

Arctic Aeromedical Lab., Ladd AFB, Alaska.
THE COMPARATIVE TOLERANCE OF NEGROES AND CAUCASIANS TO A STANDARDIZED COLD STRESS AS INDICATED BY BODY TEMPERATURE AND METABOLIC RATE, by Thomas Adams and Donald W Rennie. Sep 57, 25p. 18 refs. Technical rept. 57-20
Order from LC mi$2.70, ph$4.80 PB 153 351

Although the Caucasians had a significant increase in heat production during the cold exposure, the metabolism of the Negro was not significantly increased. It is assumed that increased shivering activity among the white subjects accounts for the difference in metabolism between the two groups. It is postulated that the warmer hands and fingers of the Caucasian subjects caused a more rapid rate of heat loss from this group and that this increased heat loss stimulated shivering. The implications of the comparative response of these groups to cold is discussed from the viewpoint of operational efficiency in a cold environment, and the direction of future studies is suggested.

Arctic Aeromedical Lab., Ladd AFB, Alaska.
THE CUTANEOUS PAIN THRESHOLD IN THE NATIVE ALASKAN INDIAN AND ESKIMO, by J. Patrick Meehan, Alice M. Stoll, and James D. Hardy (Cornell U. Medical Coll.). Dec 53, 15p. 9 refs. Proj. no. 22-1301-0002, rept. no. 9.
Order from LC mi$2.40, ph$3.30 PB 153 328

As no significant difference in pain threshold was found to exist between the Indian, Eskimo, and White subjects, it must be concluded that (1) in these groups cultural differences are not such as to affect the pain threshold as determined by this method; and (2) the ability of the Alaskan Indian and Eskimo to expose his skin to extreme cold without injury is not associated with an elevation of this threshold. It is possible, however, that exposure to cold stimulation might reveal a relative elevation of the "cold" pain threshold in the Alaskan Indian and Eskimo as compared to the populations of warmer climates.

Arctic Aeromedical Lab., Ladd AFB, Alaska.
THE EFFECT OF PROLONGED ARCTIC FLIGHT ON NIGHT VISUAL ACUITY, by Horace F. Drury and Kaare Rodahl. Aug 52, 17p. 2 refs. Proj. no. 22-1201-0001, rept. no. 1.
Order from LC mi$2.40, ph$3.30 PB 153 326

Light exposure during prolonged polar flights at high altitude is not sufficiently intense at any season of the year to produce significant effects on subsequent night visual acuity. There is a distinct possibility that a partial acclimatization to altitude sufficient to bring about improvement in night visual acuity may occur during an exposure of 15 to 18 hours to a pressure altitude of 8,000 to 10,000 feet. The physiological and psychological stresses attendant upon prolonged night flights may bring about a significant and perhaps serious decrease in night visual acuity following extended missions. Since these stresses are independent of exposure to high light intensities, they may be expected to operate at all latitudes.

Arctic Aeromedical Lab., Ladd AFB, Alaska.
EVALUATION OF GLYCINE IN FROSTBITE PROPHYLAXIS, by William R. Beavers and Benjamin G. Covino. Nov 57, 15p. 9 refs. Technical rept. 57-24.
Order from LC mi$2.40, ph$3.30 PB 153 353

Under many operational situations, military personnel are unable adequately to increase heat production by muscle activity in response to cold stress. An agent capable of increasing visceral heat production might be useful in the prevention of cold injury. Glycine, an amino acid with a high specific dynamic action, was given in 30 gm. oral doses to six young adult males. The individuals served as their own controls when receiving 30 gm. glucose. In a 29° C. room 1 hour after ingestion, glycine produced an average 9.2% increase in resting metabolism. In a -17.8° C. (0° F.) cold room 2 hours after ingestion of glycine, metabolism continued higher and the subject had higher toe, forehead, and average body temperatures. No differences were noted in finger temperatures, but forefinger blood flow was greater when glycine was ingested. Glycine may be of practical value in increasing heat production under certain conditions. (Author)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
HIND LIMB BLOOD FLOW DURING IMMERSION HYPOTHERMIA, by Benjamin G. Covino and William R. Beavers. Jan 57, 14p. 20 refs. Proj. no. 8-7954, rept. no. 2.
Order from LC mi$2.40, ph$3.30 PB 153 342

A marked vasodilatation was observed in the hind limb of dogs subjected to immersion hypothermia. An initial dilatation occurred at a rectal temperature of 35° C., while a second dilatation took place at a rectal temperature of 28 - 25° C. The primary response appeared

due to the stimulation of sympathetic cholinergic dilator fibers supplying arterio-venous anastomotic vessels in skeletal muscle. This response could be inhibited by atropinization and/or sympathectomy-acrenalectomy. The secondary dilatation was unrelated to nervous or local metabolic factors. This phenomenon was correlated with an extremely low muscle and blood temperature, and so is believed due to the direct influence of cold on the skeletal muscle arteriolar-capillary circuit. (Author)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
HUMAN ACCLIMATIZATION TO COLD, by Kaare Rodahl. Oct 57, 52p. 65 refs. Technical rept. 57-21.
Order from LC mi$3.60, ph$9.30 PB 153 352

Previous studies of human acclimatization to cold are reviewed and compared with data from animal experiments. Results from Eskimo studies are summarized in terms of environmental exposure, activity, food intake, metabolic response, thyroid activity, evaporative heat loss, changes in blood and tissues, and physical fitness. The mechanism of general acclimatization to cold is discussed and various aspects of local acclimatization are considered. Finally, certain promising areas of future research are suggested. (Author)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
INDIVIDUAL AND RACIAL VARIATIONS IN A VASCULAR RESPONSE TO A COLD STIMULUS, by John P. Meehan. Apr 55, 13p. 4 refs. Proj. no. 7-7953, rept. no. 1.
Order from LC mi$2.40, ph$3.30 PB 153 338

An experimental precedure involving the recording of surface finger temperatures during a thirty minute ice water immersion period, was performed on groups of Caucasian, Negro and Alaskan Native subjects. The average finger temperature for the last 25 minutes of the immersion period, and the lowest finger temperature recorded, were used as the basis for comparing the responses of the various subject groups. The Alaskan Native group maintained the highest finger temperatures during the immersion period, while the Negro group maintained the lowest. The experimental data indicate the possibility of a physiologic adaptation to cold on a racial as opposed to an individual basis. A physiologic basis for the reported higher percentage incidence of cold injury, seen in Negro military personnel engaged in cold weather operations, is presented. (Author)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
LIVER PHOSPHORUS METABOLISM IN THE COLD-ACCLIMATIZED RAT, by John P. Hannon. July 60, 20p. 39 refs. Technical rept. no. 58-16.
Order from LC mi$2.40, ph$3.30 PB 152 695

Liver homogenates from control and 1-month cold-exposed (5° ± 1°C) rats were assayed for the P/O ratios characteristic of succinate and β-hydroxybutyrate oxidations and for the level of adenosinetriphosphatase activity. With both substrates a significant lowering of the P/O ratio was observed in the cold-exposed group. Measurements of adenosinetriphosphatase activity in water homogenates showed that calcium and magnesium had strong activating effects. Little difference was found between control and experimental preparations except where both ions were used simultaneously. Here, the tissue from the cold-exposed group exhibited a slightly lower activity than the controls. Adenosinetriphosphatase assays of homogenates prepared in isotonic sucrose and measured at various tonicity levels showed that both groups responded similarly. However, slight differences between the control and experimental preparations were noted when magnesium was used as the activating ion. The data were discussed in relation to the high thyroid activity of the cold-exposed animal. (Author)

Institut fur Animalische Physiologie der J. W. Goethe Universitat (West Germany).
INVESTIGATIONS ON THE FLOW OF BLOOD IN CAPILLARIES, by Rudolf K. Zahn. Final technical status rept. for 1 Oct 59-30 Sep 60 on Contract DA 91-591-EUC-1302-OI-4171-60. [1960] 16p. 24 refs. AD-244 921.
Order from LC mi$2.40, ph$3.30 PB 152 690

Experiments with agents influencing the mechanism of blood clotting showed a delay of onset of ultra-violet-stasis with heparine, and an acceleration of stasis with protaminesulfate and Tween 80. Furthermore heparine and protaminesulfate were shown to exert an antagonistic influence on the onset of stasis so that intravacal clotting is considered to be a major cause of ultra-violet-stasis. The endeavour to prove changes of permeability of the walls of blood vessels before onset of stasis by use of vital dyes yielded no results. Histamine, 5-hydroxy-triptamine and reserpine injected into the dorsal lymphatic sac failed to exert an influence on the occurence of ultra-violet-stasis. Experiments with weekly repeated administration of desoxy-ribo-nucleic-acid, desoxy-ribo-nucleasel and autoclaved desoxy-ribo-nucleasel so far resulted in an increased gain of weight of the animals subjected to desoxy-ribo-nucleic-acid and autoclaved desoxy-ribo-nucleasel. In the chronic experiment autoclaved desoxy-ribo-nucleasel accelerates the onset of stasis, whereas desoxy-ribo-nucleic-acid delays it. Measurement of the permeability of the web skin yielded no significant differences between the different groups.

Institute of Andean Biology, Lima (Peru).
THE INFLUENCE OF HIGH ALTITUDES ON THE ELECTRICAL ACTIVITY OF THE HEART. ELECTROCARDIOGRAPHIC AND VECTORCARDIOGRAPHIC OBSERVATIONS IN THE NEWBORN, INFANTS, AND CHILDREN, by Dante Penaloza, Raul Gamboa and others. Aug 60, 21p. 62 refs. AFSAM rept. no. 60-79.
Order from LC mi$2.70, ph$4.80 PB 152 763

Five hundred forty normal children were studied: 350 at sea level and 190 in Morococha, 14,900 feet above sea level. The comparative study was made in children of five age groups, ranging from newborn to 14 years. In the newborn (both at sea level and at high altitudes) the electrical activity of the heart showed similar characteristics. Some weeks after birth there developed a definite difference in the ECG of infants at the two elevations. At high altitude, an accentuated right AQRS deviation persists during infancy and childhood. In the

high altitudes, during the first weeks or months of life the T loop shifts to a forward position and the T wave becomes positive in the right precordial leads. In healthy children of the high altitudes there exists a moderate degree of right ventricular hypertrophy. The electrocardiographic and vectorcardiographic characteristics of the healthy children living permanently at high altitudes are not comparable with those of the normal children at sea level. A high altitude environment is an important source of electrocardiographic and vectorcardiographic variability in healthy children. (Author)

Oklahoma U. School of Medicine, Oklahoma City.
HEAT LOSS FROM THE RESPIRATORY TRACT IN COLD, by Paul Webb. Final rept. on Contract AF 18(600)355. Apr 55, 14p. AAL proj. no. 7-7951, rept. no. 3.
Order from LC mi$3.30, ph$7.80 PB 153 337

A new method for the measurement of water vapor in expired air has been developed and used in cold conditions in Alaska. Additional temperature data were gathered at the same time to supplement the information from a previous study. From this experimental information a realistic assessment of respiratory tract heat loss becomes possible.

St. Louis U. School of Medicine, Mo.
REFINEMENTS IN PHOTOELECTRIC PLETHYSMOGRAPHY, by Alrick B. Hertzman and Walter Ciszczon. Rept. on Contract AF 18(600)1043. July 60, 20p. 9 refs Technical rept. no. 57-15.
Order from LC mi$2.40, ph$3.30 PB 152 617

Circuits are described which permit convenient and continuous calibration of photoelectric recordings of variations in tissue blood content in terms of fractional changes in photoelectric current. This procedure is applicable to plethysmograms and volume pulses whether recorded by optical galvanometers or direct writers. Drift in prolonged records may be eliminated by photoelectric monitoring of the light bulb. An oscillator which may be controlled by the light monitor has been designed to supply a constant AC voltage (at 10 kc) to the filament of the light bulb. These arrangements increase the convenience and dependability of application of the technique of photoelectric plethysmography to climatic experiments. (Author)

School of Aviation Medicine, Brooks AFB, Tex.
INTERNATIONAL SYMPOSIUM ON CARDIOLOGY IN AVIATION [NO. 1] CONDUCTED AT THE SCHOOL OF AVIATION MEDICINE, 12-13 NOVEMBER 1959, by Lawrence E. Lamb, ed. [1959] 429p. 383 refs.
Order from LC mi$11.10, ph$65.10 PB 152 460

Contents:
Sect. 1. Aerospace Flight and the Normal Cardiovascular System: Influence of aerospace flight on the normal cardiovascular system - stresses and effects
Sect. 2. Cardiovascular Techniques: Phonocardiography Current status of vectorcardiography; Telemetering physiological responses during experimental flights
Sect. 3. Cardiovascular Disorders in Aircrew personnel: Pathologic findings in the cardiovascular system of military flying personnel; The cardiovascular system of the aging pilot; The problem of loss of consciousness in flying personnel; The problem of elevated blood pressure or hypertension in the pilot; Cardiovascular diseases in the flying population
Sect. 4. Electrocardiographic Studies; Royal Canadian Air Force experiences in electrocardiographic evaluation; The prognostic implications of the electrocardiogram; Electrocardiographic findings in 67,375 asymptomatic individuals: Part 1: Incidence of abnormalities; Part 2: Supraventricular rhythms; Part 3: Ventricular rhythms; Part 4: Wolff-Parkinson-White syndrome; Part 5: Complete left bundle branch block; Part 6: Complete right bundle branch block; Part 7: A-V block; Part 8: Non-specific T-wave changes; Part 9: Myocardial infarction; Part 10: Normal values
Sect. 5. Limits of Cardiovascular Normality for Flying The National Program for Study of Cardiovascular Disease

Technische Hochschule, Karlsruhe (West Germany).
MECHANICAL AND ELECTRICAL PHENOMENA OF THE HEART ACTION, by W. Ernsthausen and W. v. Wittern. Final rept. on Contract AF 61(514)1063. Mar 60, 40p. 13 refs. AFOSR TR-60-134.
Order from LC mi$3.00, ph$6.30 PB 153 037

The report covers the "electromechanics" of the heart. A new method for the simultaneous recording of motion and voltage between two points on the heart's surface is described. Measurements on dog hearts recorded with this method under various conditions are reported. (Author)

Tufts U. School of Medicine, Boston, Mass.
ALTERATIONS IN HEPATIC LIPID METABOLISM INDUCED BY ACCLIMATION TO LOW ENVIRONMENTAL TEMPERATURES, by E. J. Masoro. July 60, 23p. 22 refs. Technical rept. no. 59-25; AD-244 757.
Order from LC mi$2.70, ph$4.80 PB 152 618

A review is made of the author's work on cold acclimation and its relation to hepatic lipid metabolism. Data on the mechanisms underlying the marked capacity of the liver of the cold-acclimated rat to preserve liver glycogen stores during fasting are presented. These mechanisms were shown to be intimately associated with hepatic lipid metabolism. Information is also given pertinent to the use of hepatic tissue of cold-acclimated rats as a tool for the study of physiologic regulation of intermediary metabolism. (Author)

Tulane U., New Orleans, La.
CATALOG OF TRANSLATED MATERIAL IN SPACE PERCEPTION, ed. by Cecil W. Mann. Rept. on Contract N7onr-434, T.O. I. 15 May 55, 43p. 427 refs. Joint Proj. rept. no. NM 001 110 500.37, formerly NM 001 063.01.37.
Order from LC mi$3.30, ph$7.80 PB 153 575

This report released for sale to the public 4 Jan 61.

This report is a catalog of bibliographic materials in the area of proprioceptive, vestibular function and vision which have been translated from foreign languages. The catalog lists 427 items. The catalog is arranged in the author-alphabetical format adopted by the American Psychological Association. (Author)

University of Southern California. School of Medicine, Los Angeles.
HUMAN PSYCHOMOTOR PERFORMANCE UNDER VARIED TRANSVERSE ACCELERATIONS, by Richard C. Kaehler and John P. Meehan. Rept. on Biophysics of Flight, Contract AF 33(616)5407. Aug 60, 54p. WADD Technical rept. 60-621.
Order from OTS $1.50 PB 171 304

Five male college students, 20 to 25 years old, were exposed to transverse accelerations from front-to-back up to 8 g and back-to-front up to 4 g on the USC centrifuge to investigate human motor performance. The results show that man can, with the proper controls and properly located in the workplace, participate effectively in aircraft control when exposed to relatively high transverse accelerations. During front-to-back acceleration, man can perceive a visual stimulus, reach and adjust controls, e.g., the horizontal lever, toggle switch, and push-to-test button, regardless of location in a mean time of 1.0 second at 8 g. Controls normally more difficult to operate, the vertical wheel and rotating knob, require a mean time of 1.5 seconds at 8 g. For back-to-front accelerations, the toggle switch, horizontal lever, and push-to-test button require a mean time of 0.7 second at 4 g, whereas, the vertical wheel and rotating knob require a mean time of 1.0 second. (Author)

University of Southern California. School of Medicine, Los Angeles.
RENAL RESPONSES TO POSITIVE ACCELERATION, by John P. Meehan. Rept. on Biophysics of Flight, Contract AF 33(616)5407. Sep 60, 20p. 12 refs. WADD Technical rept. 60-637.
Order from OTS $0.50 PB 171 343

The para-amino hippurate (PAH) clearances, creatinine clearances and urine flows of young male subjects exposed to positive acceleration have been studied. Exposures at 3 g for 10 minutes produced no consistent changes in the above parameters from control values. Longer exposures at 3 g produced a reduction of the para-amino hippurate (PAH) clearance in some subjects, no consistent changes in creatinine clearances, and significant reductions in urine flow following centrifugation. It is concluded that positive acceleration as used in the present experiments affects the kidney primarily through mechanisms involving a reduction of the thoracic blood volume. (Author)

Washington U., Seattle. School of Medicine.
THE ROLE OF THE THYROID IN THE METABOLIC RESPONSE TO LOW TEMPERATURE, by L. D. Carlson and A. C. L. Hsieh. Rept. on Contract AF 18(600)1467. May 57, 14p. 29 refs. AAL Technical rept. 57-1.
Order from LC mi$2.40, ph$3.30 PB 153 344

The requirement for thyroxin in chemical regulation of heat production has been studied by testing the metabolic response of curarized rats to cold exposure at varying periods after thyroidectomy. Sprague-Dawley rats were kept at 5° C and 28° C. The metabolic response to cold in curarized rats is not directly dependent upon the amount of circulating thyroxin because the response persists when thyroxin stores are depleted. Cold-adapted rats reduced their food intake and lost weight following thyroidectomy, but maintained a high metabolism at 5° C. (Author)

Willow Run Labs., U. of Michigan, Ann Arbor.
A STATISTICAL APPROACH TO THE PROBLEM OF SPATIAL AND TEMPORAL INTEGRATION IN VISUAL DETECTION, by W. M. Kincaid and A. B. Clarke. Rept. on Proj. Michigan, Contract DA 36-039-sc-78801. Oct 60, 23p. 4 refs. 2900-57-T; AD-245 117.
Order from LC mi$2.70, ph$4.80 PB 152 605

A critical examination of an earlier formulation of the effects of target size and shape upon visual detection leads to a more sophisticated approach, which is also applicable to the more general problem of the relation between the spatial-temporal characteristics of a target and its detectability. It is postulated that the detection of a target involves a decision process analogous to the testing of a statistical hypothesis, using the most powerful test in the sense of Neyman and Pearson. The determination of the most powerful test in a given situation is equivalent to the solution of a set of equations. A formal solution can be obtained. (Author)

Biochemistry

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
THE PREPARATION OF REDUCED CYTOCHROME c BY MEANS OF ELECTRON-EXCHANGE RESINS, by Herman W. Shmukler and Frederick G. Schappell. Rept. no. 12 on Proj. MR005.15-0002.7; Proj. TED ADC RS-7045 (5915-A). 31 Aug 60, 9p. 6 refs. NADC-MA-6031; AD-244 372.
Order from LC mi$1.80, ph$1.80 PB 152 470

By use of an electron-exchange resin (Duolite S-30) it was possible to prepare reduced cytochrome c. The extent of reduction and the purity of the product indicate that it would be suitable for in vitro studies of cytochrome c oxidase activity. The cytochrome c prepared by this method was found to have a slower rate of auto-oxidation than a similar preparation reduced by dithionite while retaining its enzymatic activity as a substrate for cytochrome c oxidase. The advantages of this method in respect to the present means of reducing cytochrome c (treatment with dithionite and hydrogenation using a platinum or palladium catalyst) are the freedom from ionic contaminates either dithionite or heavy metals and the elimination of the need for a metal catalyst and the subsequent filtering involved. (Author)

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
X-RAY DIFFRACTION STUDIES OF CYTOSINE, URACIL AND THYMINE, by Emma Fessenden. Rept. no. 1 on Proj. MR005.15-0002.11. 30 Aug 60, 15p. 11 refs. NADC-MA-6030.
Order from LC mi$2.40, ph$3.30 PB 152 740

X-ray diffraction patterns for three biological pyrimidines are presented. Wherever possible the indexed pattern has been completed. Cytosine monohydrate, thymine and uracil all have been determined as belonging to the monoclinic crystallographic system. The system of cytosine is not elaborated. Various forms of cytosine are given in the literature with some degree of uncertainty. Cytosines from several sources were examined. By investigation with recrystallization and by drying methods, the patterns for cytosine and cytosine monohydrate were resolved. All patterns given in the literature may be explained by varying the ratio of mixture of the two compounds. The pattern of uracil was refined and indexed. The pattern of thymine was confirmed, the unit cell determined and the indexing completed. (Author)

Washington U., Seattle. School of Medicine.
AN IMPROVED METHOD FOR THE DETERMINATION OF URINARY 17-KETOSTEROIDS, by Minoru Masuda and Horace C. Thuline. Research rept. on Contract AF 33(038)22916. Mar 53, 10p. 9 refs. AAL Proj. no. 22-1301-0002.
Order from LC mi$1.80, ph$1.80 PB 153 327

A simple method of estimation of total neutral 17-ketosteroids is given in which the final Zimmerman color is extracted with amyl acetate. The extraction with organic solvent leaves behind in the aqueous layer the non-ketonic interfering chromogens. The definite reduction in titer by this method is comparable to the reduction in titer after micro-Girard separation and chromatography. Pure 17-ketosteroids and urine extracts show linearity according to Beer's Law with this method.

Microbiology

Georgia Inst. of Tech., Engineering Experiment Station, Atlanta.
THE EFFECT OF LOW TEMPERATURES ON THE SURVIVAL OF AIRBORNE BACTERIA, by T. W. Kethley, E. L. Fincher, and W. B. Cown. Final rept. Mar 57, 63p. 17 refs. AAL proj. no. 8-7958.
Order from LC mi$3.90, ph$10.80 PB 153 343

Results are reported for studies on various airborne bacteria under varying conditions of relative humidity at low temperatures. A complete description is given of the special aerosol cylinders devised for carrying out these studies. Employing airborne bacterial particles dispersed from beef broth cultures, extensive studies are reported for Serratia marcescens (ATCC 274, primary form), and Escherichia coli (ATCC 10536) for the range of temperatures 80°F to -40°F. Preliminary studies are reported for Serratia indica (ATCC 4003), Micrococcus pyogenes var. aureus (ATCC 6538) and Micrococcus pyogenes var. albus (ATCC 9491). It is concluded that the experimental bacterial particles studied are very similar to those arising from natural causes and that the findings are generally applicable to many naturally occurring airborne bacteria. The very low death rate observed for the experimental bacterial aerosols at low temperatures is consistent with previous reports of the presence of viable bacteria in the upper atmospheres. It is further concluded that although the death rate of airborne bacteria is very small at low temperatures, the factors which determine the fate of these organisms are similar to those operating at higher temperatures.

Materials Lab., Wright Air Development [Div.] Wright-Patterson AFB, Ohio.
RESISTANCE OF MICROORGANISMS TO HIGH VACUUMS, by Sam Bakanauskas. Rept. for July 58-Apr 59 on Finishes and Materials Preservation. Apr 59, 16p. WADC Technical note 59-142; AD-228 156.
Order from LC mi$2.40, ph$3.30 PB 153 573

This report released for sale to the public 4 Jan 61.

A study was made to determine the effect of prolonged dynamic vacuums on the viability of selected spore-forming fungi and bacteria. The microorganisms were exposed to pressures ranging from 1×10^{-5} to 5×10^{-7} mm Hg for periods of 2, 4, 8, 16, and 32 days. Microorganisms used were: Aspergillus niger WADC 8, Aspergillus flavus WADC 26, Bacillus globigii WADC B5, Bacillus mycoides WADC B8, and Bacillus cereus WADC B6. With the exception of B. cereus WADC B6, spores of all microorganisms remained viable after 32 days exposure. (Author)

Trinity Coll., Dublin (Erie).
TO INVESTIGATE THE VARIETY OF BACTERIAL MUTANTS OCCURRING SPONTANEOUSLY AND PRODUCED BY VARIOUS RADIATIONS AND CHEMICALS, by G. W. P. Dawson. Final technical rept. for 1 Sep 59-31 Aug 60 on Contract DA 91-591-EUC-1178. Sep 60, 23p. 6 refs.
Order from LC mi$2.70, ph$4.80 PB 152 477

Studies of spontaneously occurring reverse mutations in Salmonella typhimurium have been designed to explore the range of genetic changes that cause these reversions. To be able to classify reversions as precisely as possible is a necessary preliminary to the study of the response of genes to mutagens. Reversions of the leucine requiring mutant leu151 have been chosen for detailed study. A second line of investigation is based on the expectation that there may be more than one physiologically effective information pattern of a gene. Reversions of the site mutant tryptophane A8 are being examined to discover whether any of these reversions arise by changes within the tryptophane A locus but not involving a change in the A8 site.

Neurology and Psychiatry

California U., Los Angeles. School of Medicine.
NERVOUS CONTROL OF SHIVERING. SHIVERING AS A RESULT OF BRAIN STIMULATION, by Lucy Birzis and Allan Hemingway. June 57, 16p. 4 refs. AAL Technical rept. no. 57-10.
Order from LC mi$2.40, ph$3.30 PB 153 349

Electrical stimulation at 21 sites in the brain stem of 5 cats under light barbiturate anesthesia resulted in

the production of a tremor having the characteristics of natural shivering. The positive stimulation sites lay within the lesion-determined "shivering pathway" in the midbrain and pons. The positive hypothalamic stimulation site was located in the medial part of the tuberal hypothalamus, between the mammillothalamic tract and the fornix. (Author) (See also PB 146 618).

California U., Los Angeles.
NERVOUS CONTROL OF SHIVERING. II. A DESCENDING PATHWAY FROM THE PREOPTIC SHIVERING SUPPRESSOR REGION, by Lucy Birzis, Takio Shimamoto, and Allan Hemingway. Rept. on Contract AF 18(600)358. Mar 54, 7p. 2 refs. AAL Proj. no. 22-1301-0009, rept. no. 2.
Order from LC mi$1.80, ph$1.80 PB 153 330

There is a descending conduction pathway from the shivering suppression "center' in the diencephalon extending caudally at least through the medulla. Electrical stimulation along this pathway suppresses shivering. One interpretation of these results might be that central control of shivering is accomplished over this route. Instead of acting on the site of origin of the shivering impulses (presumably the posterior hypothalamus), the inhibitory influence may be exerted at lower motor centers, perhaps at the ventral horn outflow, although the conduction pathway in the cord has not been investigated. Direct suppression of the ventral horn cells innervating particular muscle groups would be a means of obtaining the graded response that is characteristic of the shivering process. (Author) (See also PB 153 349).

California U., Los Angeles. School of Medicine.
NERVOUS CONTROL OF SHIVERING. VI. EFFERENT BRAIN DISCHARGE DURING SHIVERING, by Lucy Birzis and Allan Hemingway. June 57, 19p. 9 refs. AAL Technical rept. 57-11.
Order from LC mi$2.40, ph$3.30 PB 153 350

Action potentials associated with shivering have been recorded from the brain stem of the cat using large (25μ diameter) microelectrodes. The electrodes, from which shivering action potentials were obtained, were located within the efferent shivering pathway previously determined by lesion experiments. The range of frequencies from these units was between 6 and 26 per second and appeared as a continuous stream of impluses having no rhythmic pattern. (Author) (See also PB 153 330)

Pathology

Army Chemical Research and Development Labs., Army Chemical Center, Md.
THE COMPARISON OF THE BURN-PRODUCING EFFECTIVENESS OF SOME GASOLINE-BASE INCENDIARY AGENTS, by M. J. Margovich. Sep 60, 31p. 5 refs. CRDLR 3024; AD-243 348.
Order from LC mi$3.00, ph$6.30 PB 152 599

Brooke Army Medical Center, Fort Sam Houston, Tex.
THE INCREASE OF THE GRAM-NEGATIVE: GRAM-POSITIVE ORGANISM RATIO IN BURN DEATHS ASSOCIATED WITH SEPTICEMIA, by Wilfred T. Tumbusch, John V. Butkiewicz and others. Rept. on Radiation and Thermal Burns, Proj. no. 6-59-12-028. Oct 59, 10p. MEDEW-RS-3-59; AD-243 989.
Order from LC mi$1.80, ph$1.80 PB 152 368

Surface and blood cultures from burned patients treated at the US Army Surgical Research Unit during the past six and one-half years have been reviewed. Since 1955, there has been a gradual decrease in incidence of Gram-positive organisms and a gradual increase in incidence of Gram-negative bacteria cultured from wounds and the peripheral blood. The clinical course of patients who have died in the past twenty months with Gram-negative septicemia has been described. (Author)

Kansas U., Lawrence.
STUDIES ON THE INCIDENCE OF TULAREMIA IN ALASKA, by Cora Downs. June 60, 31p. 7 refs. Technical rept. no. 57-43; AD-244 756.
Order from LC mi$3.00, ph$6.30 PB 152 619

Chemical purification of the Ascoli antigen from infected mice has been accomplished by methanol precipitation in the cold. Maximum recovery of active substance occurred at 60% methanol concentration. Paper electrophoresis and ultracentrifugation showed that much of the crude Ascoli was made up of particulate material which gave unsatisfactory results in electrophoresis and was not amenable to analysis by ultracentrifugation. Determinations for nonglucose amine showed that alcohol precipitation concentrated this component. Paper chromatography showed that crude normal and crude infected Ascoli contained glycine, proline, aspartic acid, leucine, glutamic acid, histidine, alanine and methionine. The alcohol-purified Ascoli contained glycine, glutamic acid, and alanine only. Centrifugation of the crude infected Ascoli and purified Ascoli at 60,000 rpm gave a gelatinous sediment which contained a negligible amount of protein but which was active both as a sensitizer and inhibitor in the hemagglutination test and which protected mice against challenge with fully virulent Pasteurella tularensis. Chymotrypsin treatment of this gelatinous material decreased nitrogen from 2.17 mg/ml to 0.2 mg/ml without decreasing the serological activity. Further tests for the characterization of this antigen are planned. (Author)

North Carolina State Coll., Raleigh.
STUDY OF ALASKAN SCHISTOSOMES, by Reinard Harkema. Rept. on Contract AF 18(600)187. June 53, 28p. 9 refs. AAL proj. no. 22-1401-0005.
Order from LC mi$2.70, ph$4.80 PB 153 332

Schistosome dermatitis is a disease of place and the infection of man is dependent directly upon exposure to waters containing snails infected with the larval stages of the schistosome. There are many opportunities for personnel to become exposed to the cercariae. Many lakes in the vicinity of Fairbanks are fairly attractive for swimming and several of them are infested. Personnel in the field often bathe in any lake or pond available. There is the very definite possibility that such

waters may be infested. Personnel can avoid infection by staying out of the water. A program of education informing personnel of the hazards from swimming or bathing in infested water is the best method of preventing infection.

Science and Technology Div., Library of Congress, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY (FORMERLY: AVIATION MEDICINE) AN ANNOTATED BIBLIOGRAPHY. VOLUME III: 1954 LITERATURE, by Arnold J. Jacobius, Roman Kenk and others. 1960, 547p. 1, 386 refs.
Order from OTS $6.00 PB 171 029

The change of title brings into relief the fact that the general subject scope of the bibliography has been expanded to include new areas of interest in space-medical and space-biological research. To the subject fields heretofore covered by the bibliography new ones have been added, such as Biological Rhythms, Biological Orientation, Closed Ecological Systems, Physiological and Psychological Effects of Heat, Cold, Isolation, Restraint, and many others. References are arranged alphabetically by author; abstracts are informative; and full bibliographic information is provided, including foreign and translated titles, volume and issue numbers, place of publication (if foreign), inclusive paging, full dates, and library call numbers or other location symbols. While the bulk of the publication is devoted to journal articles, reports, and monographs published during the year 1954, items published in 1952 or 1953 not included in the preceding volumes have been incorporated in this volume.

University of Southern California. School of Medicine Los Angeles.
MAINTENANCE OF THE INTEGRITY OF THE BLOOD VASCULAR SYSTEM. ITS RELATION TO ANTICOAGULANTS AND BLOOD COAGULATION MECHANISM, by Chester Hyman, Thomas E. Nelson, and Eli Castronova. June 57, 42p. 14 refs. AAL Technical rept. 57-9.
Order from LC mi$3.30, ph$7.80 PB 153 348

The purpose of this investigation was to observe certain alterations in the physiology of the blood vascular wall during the development of purpura in the thrombocytopenic and hypoprothrombinemic rabbit, and thus gain further knowledge of the pathogenesis of the hemorrhagic diathesis associated with hemostatic disorders. Alteration in vascular permeability to plasma proteins was estimated by one of three different methods: by observing the rate of disappearance of dye-labeled plasma protein from the blood, by determining the rate of transfer of labeled protein to the thoracic duct lymph, or by calculating the rate at which dye-labeled protein passes into the peritoneal cavity. It was found that the mechanism of vascular breakdown following anti-platelet serum is unlike that caused by dicumarol. An increase in vascular permeability to plasma protein does not seem to be an integral step in the development of thrombocytopenic purpura, but dicumarol purpura can be directly related to increased protein leakage. Although the vascular injury resulting from antiplatelet serum administration appears to be due primarily to a direct vascular injury by the antiserum, the alterations in vascular integrity observed with dicumarol under certain experimental conditions can be related to the resulting hypoprothrombinemia. (Author)

Pharmacology and Toxicology

[Army Chemical Research and Development Labs.] Army Chemical Center, Md.
COMPARISON OF SEVERAL METHODS USED BY GASSING BRANCH FOR COLLECTION AND ANALYSIS OF GB VAPOR IN AIR AT LOW CONCENTRATION LEVELS, by Fred W. Oberst, Francis P. McGrath and others. May 52, declassified 16 Apr 59. 23p. 10 refs. Medical Labs. Research rept. no. 111.
Order from LC mi$2.70, ph$4.80 PB 149 634

The object has been to evaluate and to make improvements on several existing methods for collection and determination of low concentration of GB vapor dispersed in air. The results of this investigation show that a wide range of concentrations of GB vapor in air can be determined by proper selection of collection and analytical methods. The colorimetric method using Tetralin for collecting the sample is suitable in the range of 2 to 50 mg/m^3 while with Tetralin-isopropanol in beaded tubes it is satisfactory between 0.1 and 3 mg/m^3. The fluorimetric method is satisfactory in the range of 0.01 to 1 mg/m^3 while the enzymatic method may be used at levels ranging from 0.0005 to 0.02 mg/m^3. (Author)

Army Chemical [Research and Development] Labs., Army Chemical Center, Md.
METABOLISM OF 2-FORMYL-1-METHYL PYRIDINIUM IODIDE OXIME (2-PAM), by Sarah C. Kalser. Dec 59, 11p. 6 refs. CWLR 2347; AD-231 130.
Order from LC mi$2.40, ph$3.30 PB 149 635

After intravenous injection of 2-PAM labeled with C^{14} by N-methylation, the plasma level of radiocarbon rises to a maximum at 10 to 20 minutes in the cat. Thereafter, the label disappears from the blood quite rapidly, so that by 2.5 hours after injection of 2-PAM only 0.3% of the label remains. The excretion of label after intravenous injection of 2-PAM appears to be largely in urine, a mean of 72% of the C^{14} injected as 2-PAM being excreted in the urine of the mouse within 24 hours after the injection and 39% being excreted within 2.5 hours in the urine of one cat. Fecal excretion by the mouse within 24 hours amounts to not more than about 5%. Less than 0.2% of the label appears in expired air as $C^{14}O_2$. In the mouse, the label appears to be secreted into the duodenal and jejunal segment of intestine, in bile, and possible in pancreatic secretion, and to be reabsorbed largely in the more distal segments of the intestinal tract. In the mouse, the liver, duodenum and jejunum, ileum, kidneys, and empty caecum and colon contain the greatest total amounts of label. One experiment in a GB-poisoned cat yielded no evidence of metabolic alteration of 2-PAM; in the mouse, an important metabolic product of 2-PAM is probably N-methyl-pyridone-2. (Author)

Biomedical Lab., Wright Air Development Lab., Wright-Patterson AFB, Ohio.
CUMULATIVE EFFECTS OF BORANE TOXICITY AS REVEALED BY A CLINICAL TEST, by Dwight F. Miller, Anton A. Tamas and others. Rept. on Health Hazards of Materials and Radiation. Aug 60, 14p. 9 refs. WADD Technical rept. 60-604.
Order from OTS $0.50 PB 171 309

A series of studies on various aspects of the toxicology of the boron-derivative, high-energy fuels is presented. These studies, made possible by a new technique, supply information on the absorption and transport of boranes in the body. Evidence for the chronic buildup of boranes in the body is presented. The animal data is correlated with studies and observations of accidental human exposures and the analytical technique is evaluated. (Author)

Radiobiology

Naval Radiological Defense Lab., San Francisco, Calif.
OPERATIONAL SIGNIFICANCE OF BIOLOGICAL RECOVERY FROM CHRONIC IRRADIATION: A COMPARISON OF SEVERAL RECOVERY THEORIES, by E. Shapiro. 16 May 60, 48p. 4 refs. Research and development technical rept. USNRDL-TR-421; AD-238 299.
Order from LC mi$3.30, ph$7.80 PB 153 589

This report released for sale to the public 6 Jan 61.

Several theories that predict the way in which the body recovers from chronic exposure to whole-body radiation are applied to a typical operational situation. Adaptations of the Schwarzchild Law and Smith's modification of the Blair theory are considered. The general post-attack situation is broken down into preshelter, shelter, and post-shelter periods, and the recovery from doses received during each of these periods is computed according to each of the theories. The dependency of certain operational parameters on choice of theory is investigated. Among the parameters studied are shelter entry time, shelter residual number (shielding factor), shelter exit time, and postshelter radiological recovery effort. The study indicates that except in special cases the operational parameters are relatively insensitive to the choice of theory. (Author)

Public Health Service, Washington, D. C.
RADIOLOGICAL HEALTH DATA. VOLUME 1, NO. 9 Monthly rept. Dec 60, 56p.
Order from OTS $1.00, $9.00/yr. PB 161 371-9

Contents:
Section I.--Milk
Public Health Service Milk Monitoring Program
Strontium-90 in Bovine Milk from Minnesota
Strontium-90 Content in Canadian Dried Milk Products
Radionuclides in Human Milk
Section II.--Air
Public Health Service Radiation Surveillance Network
Naval Research Laboratory Radioactivity Measurements
Argonne National Laboratory Air Data (April-June 1960)
Radionuclide Analysis of Cincinnati Surface Air
Section III.--Water
Public Health Service National Water Quality Network
Strontium-90 in Tap Water (April-June 1960)
Section IV.--Other Data
External Gamma Activity (July 1960)
Strontium-90 Concentration in Bread Purchased in New York City (March-June 1960)
Argonne National Laboratory Soil Data (May--June 1960)
Environmental Levels of Radioactivity at Atomic Energy Commission Installations
Strontium-90 Content of Animal Fodders
(See also PB 161 371-7)

School of Aviation Medicine, Brooks AFB, Tex.
BIOLOGIC EFFECTS OF NUCLEAR RADIATION IN PRIMATES, by Robert W. Zellmer and John E. Pickering. Aug 60, 12p. 22 refs. Rept. 60-66; AD-245 179.
Order from LC mi$2.40, ph$3.30 PB 152 630

Macaca mulatta primates were exposed to the neutron and gamma radiation of nuclear detonations as one phase of an extensive animal program designed to yield a better understanding of the biologic effects of ionizing radiation. A field test utilizing ionizing radiation from nuclear devices was chosen to simulate as closely as possible the conditions of dose, dose rate, and radiation distribution that have occured in human exposures. In both detonations the radiation dose required to produce death in 30 days for 50 percent of the animals was determined. All animals were followed for acute radiation effects, and where no mortality occured, they are being followed for long-term effects such as cataract production, bone marrow change, shortening of life span, and carcinogenesis.

Zoology

Arctic Aeromedical Lab., Ladd AFB, Alaska.
A SURVEY OF INVERTEBRATE DISEASE VECTORS IN ALASKA, by John M. Geary. Nov 53, 37p. 23 refs. Proj. no. 22-1401-0004, Research rept. no. 1.
Order from LC mi$3.00, ph$6.30 PB 153 331

A large gap exists in regard to present knowledge of the externally parasitic invertebrates present in Alaska, and little is known regarding the presence of disease they may carry. That group of parasites, therefore, was the center of activity of this project for two years. Primary interest was directed towards fleas, which might be expected to transmit endemic typhus fever and sylvatic plague. There is also the possibility that bubonic plague-carriers might be present. Although of secondary importance as a vector, fleas can also transmit Rocky Mountain fever. Considerable emphasis has been placed on ticks, which in Alaska could be expected to carry tularemia and Rocky Mountain spotted fever.

Wisconsin U. [Madison].
STUDIES ON THE INTERNAL CLOCK REGULATING DAILY ACTIVITY RHYTHMS IN RODENTS, by Patricia J. DeCoursey, Final rept. and Patents rept. on Contract AF 49(638)691. 24 Aug 60, 8p. 7 refs. AFOSR-TR-60-119; AD-244 958.
Order from LC mi$1.80, ph$1.80 PB 152 631

The study emphasized the adaptive features of the physiological time sense of rodents. A measure of the time sense was obtained by recording the daily running activity of rodents in wheel cages, in constant environment conditions. A detailed study of the rhythms of the flying squirrel indicated that the squirrels had internally regulated daily rhythms of activity which in constant environmental conditions, drifted out of phase with the natural day-night cycle. In artificial or natural day schedules they gradually resynchronized their activity to the time of darkness by means of a daily rhythm of resetting by light. Similar mechanisms were found in most other nocturnal rodents tested. In diurnal rodent species a mechanism of activity synchronization also was found. This differed in important details from that of the nocturnal species. Such studies have profound implication for Air Force Research programs. Time sense has been repeatedly demonstrated in man, and an understanding of its relation to sleep-wakefulness cycles, daily blood-glucose and temperature cycles and the related daily efficiency cycles is of fundamental importance when subjecting human subjects to stress conditions requiring optimum performance. (Author)

CHEMISTRY

Naval Radiological Defense Lab., San Francisco, Calif.
FLAME PHOTOMETRIC DETERMINATION OF Na, K, Ca, Mg, AND Sr IN SEA WATER, by M. Honma. 15 Sep 55, 16p. 20 refs. Research and development technical rept. USNRDL-TR-62.
Order from LC mi$2.40, ph$3.30 PB 153 571

This report released for sale to the public 19 Jan 61.

In the determination of many alkali and alkaline earth metals, conventional analytical procedures are both time-consuming and difficult. Moreover, chemical treatment is not feasible when many analyses for both cations and anions are necessary from a small sample. A rapid, flame photometric procedure was developed by which Na, K, Mg, and Ca values are obtained directly from small volumes of sea water without chemical processing. Hazards from radioactive fumes are avoided by the use of auxiliary apparatus. The strontium determination is made in the presence of calcium after chemical separation because of sodium interference. The flame photometric results compare favorably in accuracy with those from gravimetric procedures and data available in the literature. Radiation and interaction interferences have been accounted for. (Author)

Inorganic Chemistry

Royal Inst. of Tech. (Sweden).
NOTES ON THE PREPARATION AND ANALYSIS OF HALOGENIDE-FREE RHODIUM(III) PERCHLORATE (SULFATE) SOLUTIONS, by Clara Berecki-Biedermann. Technical note no. 2 on Contract AF 61(052)181. 15 Feb 60, 11p. 12 refs. AFCRL-TN-60-462.
Order from LC mi$2.40, ph$3.30 PB 152 773

A method is described for the preparation of halogenide-free rhodium(III) perchlorate (sulfate) solutions. As starting material, rhodium chloride or rhodium bromide can be used. The halogenide was removed by means of ozone, which oxidizes "free" (not complex-bound) halogenide to halogen and Rh(III) to Rh(V): The Rh(V) produced, being a strong oxidizing agent, also reacts with the halogenide according to $Rh(V) + 2X^- \rightarrow Rh(III) + X_2$. Methods for the detection of halogenide-ions in rhodium solutions are given. (Author)

Royal Inst. of Tech. (Sweden).
NOTES ON THE PREPARATION AND ANALYSIS OF RUTHENIUM (III) AND RUTHENIUM (IV) IN SULFATE MEDIUM, by Felipe Brito. Technical note no. 1 on Contract AF 61(052)181. 15 Feb 60, 13p. 8 refs. AFCRL-TN-60-461; AD-245 503.
Order from LC mi$2.40, ph$3.30 PB 152 772

For equilibrium studies, pure solutions of ruthenium (III) and ruthenium(IV) perchlorates or sulfates are needed. A survey is given of synthetic and analytical methods reported in literature. Since none of them was suitable for the purpose, new or modified methods were worked out. For the preparation of ruthenium(IV) sulfate solution, RuO_4 was reduced with H_2O_2 in dilute H_2SO_4 and the ruthenium(IV) cations separated from complex anions by a cation exchanger. For the preparation of ruthenium(III), RuO_4 was reduced with SO_2, the excess SO_2 removed and the sulfito complex decomposed. Total ruthenium was determined by reducing to metallic ruthenium, using Mg metal, and then weighing. For determining ruthenium(III) or ruthenium(IV), a redox titration method is proposed: a known excess of cerium (IV) sulfate in $\sim$2 M H_2SO_4 is added, the RuO_4 formed is boiled off and the remaining cerium(IV) backtitrated with iron(II) + ferroin. For the determination of H, the total analytical concentration of H^+, in purely cationic Ru(IV) solutions, the ruthenium may be either held back in a H^+-saturated ion exchanger or bound by adding acetylacetone. The H^+ set free can in both cases be titrated with standard NaOH. Concordant results were obtained using these two methods. (Author)

Organic Chemistry

British Columbia U. (Canada).
VOLATILE FLUORO COMPOUNDS, by R. G. Cavell, H. C. Clark, and C. J. Willis. Technical rept. no. 1 on Contract Nonr-2659(00). July 59, 34p. 7 refs. AD-227 622.
Order from LC mi$3.00, ph$6.30 PB 149 683

A study was begun of the preparation and properties of the perfluoroalkyl derivatives of the Group III and IV elements and the properties of volatile transition metal fluorides. Trimethyltrifluoromethyltin (I) was prepared from hexamethylditin and an excess of CF_3I. Compound I decomposed readily in a vacuum at 150°C to form $(CH_3)_3SnF$ and perfluorocyclopropane; treatment with aqueous alkali at room temperature or H_2O at 100°C brought about rapid hydrolysis. Halogenation reactions involving I produced such compounds as $(CH_3)_2(CF_3)SnBr$ and $(CH_3)_2(CF_3)SnCl$, suggesting that the strength of the Sn-C bond, not the electronegativity of the organic radical determines the cleavage of alkyl- or aryl-Sn bonds. CF_3I was allowed to react with Sn or SnI; the only products were fluorocarbons having up to 9 C atoms. Reactions of perfluoroalkyl-Li derivatives with Sn compounds produced no identifiable products. Studies of the infrared spectra of NbF_5-NH_3 complexes indicated that the structure was that of a coordination compound.

Massachusetts U. [Amherst].
CHEMISTRY OF HYDRAZINE DERIVATIVES, by Louis A. Carpino. Final rept. for 15 July 56-15 Feb 60 on Contract AF 18(603)114. [1960] 3p. 5 refs. AFOSR-TR-60-24.
Order from LC mi$1.80, ph$1.80 PB 149 687

The work of this contract has been concerned with a study of the oxidative reactions of hydrazine derivatives. The guiding hypothesis in this work has been that oxidation of monosubstituted hydrazines occurs through derivatives of diimide whereas oxidation of 1,1-disubstituted hydrazines occurs through azamine intermediates. A new method of converting certain 1,1-disubstituted hydrazines to hydrocarbons was discovered and the scope of the reaction delineated. New synthetic routes to a wide variety of hydrazines were developed. Examination of the Forster azotization reaction led to the necessity of synthesizing representatives of a new class of organic compounds, the O-acyl and O-arenesulfonylhydroxylamines. These unique hydroxylamine derivatives promise to be useful aminating agents.

Queen's U., Belfast (Northern Ireland).
MECHANISMS OF THE OXIDATION OF AMINES, by H. B. Henbest. Annual technical rept. for 1 Oct 59-30 Sep 60 on Contract DA 91-591-EUC-1274. [1960] 41p. 14 refs.
Order from LC mi$3.30, ph$7.80 PB 153 085

Contents:
The reactions of tertiary amines with oxygen and with ozone.
The oxidation of amines with alkoxyl radicals.
Reactions of amines in aqueous solution with polyvalent metal oxidants.

Rochester U., N. Y.
A STUDY OF THE SYNTHESIS AND PROPERTIES OF SOME CYCLIC UNSATURATED MOLECULES OF THEORETICAL INTEREST, by V. Boekelheide. Final rept. for 1 Feb 53-28 Feb 58 on Contracts DA 30-115-ORD-421 and DA 30-115-ORD-723. [1958] 17p. 16 refs. OOR rept. 770-...; AD-211 536.
Order from LC mi$2.40, ph$3.30 PB 149 664

The following generalizations about aromatic character in polycyclic systems can be made. There are no simple rules, no magic numbers such as those of the Hückel rule, which will allow one to predict aromaticity in this case. The number of π electrons available may or may not be important, but this cannot be decided without making a proper molecular orbital calculation. Thus far for all of the cases investigated, the predictions given by simple molecular orbital theory are in qualitative agreement with the experimental facts.

Royal Holloway Coll., U. of London (Gt. Brit.)
BORON HALIDES AND DERIVED COMPOUNDS, by Arthur Finch and G. Chainani. Annual technical status rept. no. 1, 1 Oct 59-30 Sep 60, on Contract DA 91-591-EUC-1276-01-4096-60 (R & D 235). [1960] 23p. 11 refs.
Order from LC mi$2.70, ph$4.80 PB 152 767

The preparation, esterification, and orthobaric pyrolysis of the new cyclic boron compound, trimethylene chloroboronate, have been studied. A detailed scheme representing the course of pyrolysis is presented; data for new compounds are listed. The new compounds ethylene propyl boronate and trimethylene propyl boronate have been synthesised. Analytical data for these compounds and their solid amine complexes is not complete; preliminary figures are in reasonable agreement with expectation. Some exploratory experiments with Na/K alloy and halogen-containing boron compounds have been made. (Author)

Southern Research Inst., Birmingham, Ala.
FAR INFRARED SPECTRA OF SUBSTITUTED AROMATIC HYDROCARBONS, by William S. Wilcox, C. V. Stephenson, and W. C. Coburn, Jr. Rept. for 1 June 58-31 May 60 on Experimental Techniques for Materials Research, Contract AF 33(616)5855. Sep 60, 189p. 86 refs. WADD Technical rept. 60-333.
Order from OTS $3.00 PB 171 300

The results of a fundamental study of the infrared spectra of substituted aromatic hydrocarbons from 2 to 35 microns are discussed. The purpose of this work has been to explore the possibility of correlating the absorption frequencies of substituted benzenes with physical properties of the molecules or of their substituents. Since the far infrared spectra (15 to 35 microns) exhibits a greater sensitivity to changes in the substituents bonded to the aromatic ring than the rocksalt spectra (2 to 15 microns), the correlation studies have been limited to the long wavelength region. The materials, apparatus and techniques used in this study are discussed in Appendix I. The far infrared spectra of 94 substituted benzenes are given. (Author)

Physical Chemistry

Atlantic Research Corp., Alexandria, Va.
SOLID-PROPELLANT SOURCE OF CESIUM PLASMA, by Lawrence W. Fagg and Raymond Friedman. Rept. on Research on High-Pressure Plasma Production Techniques, Contract AF 49(638)651, ARPA Order no. 6-58, Task no. 11. 23 June 60, 4p. 2 refs. AFOSR TN-60-701; AD-239 696.
Order from LC mi$1.80, ph$1.80 PB 153 033

An investigation of the combustion characteristics and ion and electron density obtainable by burning mixtures of $CsClO_4$:Al and $CsNO_3$:Al is being made.

Bonn U. (West Germany).
MASS SPECTROMETRIC INVESTIGATIONS BY MEANS OF A FIELD EMISSION ION SOURCE, by H. D. Beckey and Wilhelm E. Groth. Rept. 4 of Final rept. for July 57-Apr 60 on Contract AF 61(514)1079. [1960] 51p. 17 refs. AFCRC-TR-60-276; AD-245 445.
Order from LC mi$3.60, ph$9.30 PB 152 770

Contents:
The photochemical formation and the photolysis of nitrous oxide in the extreme ultraviolet, by H. Schierholz
Photochemical formation of organic compounds from mixtures of simple gases, by H. von Weyssenhoff
Intense light sources for the vacuum ultraviolet, by E. J. Comes and E. W. Schlag
Mass spectrometric investigations by means of a field emission ion source, by H. D. Beckey

Central Technical Inst. T.N.O., The Hague (Netherlands).
HIGH TEMPERATURE GALVANIC FUEL CELLS, by G. H. J. Broers and M. Schenke. Final rept. for 1 Jan-31 Dec 59 on Contract DA 91-591-EUC-1023. Jan 60, 47p. AD-234 912.
Order from LC mi$3.30, ph$7.80 PB 149 675

An investigation was made of a new type of high-temperature cell electrolyte composed of about equal amounts of non-sintered MgO and $LiNaCO_3$. A discussion is given of various techniques for pressing and molding the electrolyte. Hydrogen, CO, and O were galvanically utilized as fuel gases to a final concentration of less than 2 volume-%, at current densities of 20 A/sq cm. The life of the cells under continuous operation ranged from 2 to 8 weeks, after which the galvanic action had not ceased. The main deterioration was thought to be a gradual loss in anode-electrolyte contact, with some influence caused by carbonate losses.

Chemical Engineering Lab., Princeton U., N. J.
CHEMICAL KINETICS AND COMBUSTION, by M. Boudart. Rept. on Contract AF 49(638)32. [1960] 25p. 38 refs. AFOSR-TN-60-1150.
Order from LC mi$2.70, ph$4.80 PB 153 090

An invited survey paper, presented at the VIIIth International Symposium on Combustion, September, 1960. Two familiar problems are discussed: The possibility of obtaining kinetic information from combustion studies and the applicability of equilibrium chemical kinetics to the bulk of the reactions in the flame. (Author)

Chemical Engineering Lab., Princeton U., N. J.
STAGNATION OF A COMPRESSIBLE AND RELAXING GAS AT A PITOT TUBE: THEORETICAL AND EXPERIMENTAL STUDY, by Stanley C. Li. Rept. on Contract AF 49(638)32. [1960] 179p. 117 refs. AFOSR-TN-60-1151; AD-246 601.
Order from LC mi$8.10, ph$27.30 PB 153 091

A complete numerical solution of the Kantrowitz problem is given for a compressible gas and a Pitot tube following Griffith. The vibrational relaxation time of sulfur dioxide has been studied over an extended temperature range. (Author)

Cornell U., Ithaca, N. Y.
CN STRETCHING BANDS IN THE RAMAN SPECTRA OF SOME GROUP Ib AND GROUP IIb COMPLEX CYANIDES, by G. W. Chantry and R. A. Plane. Rept. on Contract AF 49(638)279. 22 Mar 60, 12p. 9 refs. AFOSR-TN-60-330; AD-234 794.
Order from LC mi$2.40, ph$3.30 PB 149 681

The Raman spectra of solutions containing cuprous, argentous and mercuric ions together with cyanide ions indicate the presence of the di-, tri and tetra coordinated complexes. The spectra from solutions containing zinc and cadmium ions, respectively, with cyanide ions show, on the other hand, only the tetra coordinated complex. (Author)

Istituto di Chimica Fisica dell'Universita, Pavia (Italy).
DIPOLE MOMENT STUDIES OF DIPHENYLETHER, DIPHENYSULFIDE AND THEIR DERIVATIVES, by Mario Rolla. Final technical rept. no. 2, 1 Jan-31 Dec 59, on Contract DA 91-591-EUC-1016. 30 Jan 60, 59p. 23 refs. AD-234 916.
Order from LC mi$3.60, ph$9.30 PB 149 678

Electric dipole moments were determined for 6 diphenylether (DPhE) and for 6 diphenylsulfide (DPhS) derivatives. Each compound had a nitro group attached to the para position of one phenyl ring while the other ring had a Cl or Br atom or a methyl group attached to the ortho or meta position. The electric dipole moments were determined according to the dilute solution method in benzene solution at $20^{\circ} \pm 0.05^{\circ}C$ by means of dielectric constant, density, and refractive index measurements. (See also AD-211 444)

Kentucky U., Lexington.
N-SULFINYL AMINES. EFFECT OF STRUCTURE ON THE ALCOHOLYSIS REACTION, by Walter T. Smith, Jr. and Lowell D. Grinninger. Rept. on Contract AF 49(638)49. Oct 60, 4p. 3 refs. AFOSR-TN-60-855; AD-245 229.
Order from LC mi$1.80, ph$1.80 PB 152 746

The results are reported of a continuing study which shows that a variety of N-sulfinyl-anilines react rapidly and completely with methyl alcohol.

Lund U. (Sweden).
EQUILIBRIUM STUDIES ON THE DISPROPORTIONATION REACTION BETWEEN SOME DIALKYL DISULFIDES, by L. Haraldsson, C. J. Olander and others. Technical note no. 3 on Contract [AF] 61(052)46. 1 May 60, 10p. 7 refs. AFOSR-TN-59-573; AD-217 007.
Order from LC mi$1.80, ph$1.80 PB 152 478

The disproportionation equilibrium between two symmetric disulfides and the corresponding mixed one has

been determined at 25° and at 60° by use of vapor phase chromatographic technique. For diethyl disulfide in mixture with dimethyl- and di-i-propyl disulfide, respectively, the equilibrium constant is close to the statistically expected value, 4. For the pair diethyl- and di-t-butyl disulfide, the constant is 24. Within the uncertainty of the experiments, the equilibrium constant is temperature independent and thus ΔH is equal to zero. The strongly restricted internal rotation in di-t-butyl disulfide is responsible for the high value of the equilibrium constant. (Author)

Massachusetts U., Amherst.
THE SCATTERING OF LIGHT BY n-PARAFFIN VAPORS, by Joseph Powers, Daniel A. Keedy, and Richard S. Stein. Technical rept. no. 11 on Contract Nonr-2151(00). 23 July 59, 44p. 21 refs. AD-225 440.
Order from LC mi$3.30, ph$7.80 PB 149 631

An improved apparatus for the measurement of the depolarization value of gases and vapors has been constructed. The parallel incident light beam transmitted through the scattering volume eliminates the use of a controversial convergence correction. A photomultiplier detection system improves the reproducibility of the measurements. The depolarization values of the gases and vapors measured in this study have the same order of magnitude as the literature values. The discrepancy between the experimental and the calculated depolarization values must lie in the theory. Since the variation of the depolarization values of n-pentane and n-hexane with temperature over the range of temperature studied remained constant within the limits of experimental error, no calculation of a Boltzman type correction factor could be made. The results of the calculation of depolarization values of n-hexane and n-heptane are given in Table I for the cases of rotation and for the trans weighted refinement. (Author)

National Research Labs., Ottawa (Canada).
A PHOTO-ELECTRIC DEVICE FOR THE MEASUREMENT OF QUANTITY OF LIQUID, by R. Sandri. Sep 60, 7p. Mechanical engineering rept. MI-822.
Order from LC mi$1.80, ph$1.80 PB 153 606

The report deals with a photo-electric device producing an output voltage which is a linear function of the quantity of liquid contained in the measuring tube. After a brief discussion of the usefulness of the device, the principle of the measurement is explained. A detailed description is then given of the optical system, its function and possible sources of error. Finally, the method of calibration of the system is described. An accuracy better than 1 percent of the maximum filling can be attained. The apparatus can follow rapid changes of quantity of liquid. (Author)

Naval Radiological Defense Lab., San Francisco, Calif.
THE ASSOCIATION OF CEROUS ION WITH IODIDE, BROMIDE AND FLUORIDE IONS, by Stanley W. Mayer and S. David Schwartz. Interim rept. 7 June 49, 12p. 12 refs. AD-128(C).
Order from LC mi$2.40, ph$3.30 PB 153 588

This report released for sale to the public 19 Jan 61.

The distribution of Ce^{+3} between cation exchange resin and solutions of sodium iodide, bromide, fluoride and perchlorate has been measured. The constants for ion-pair formation between Ce^{+3} and the halides have been calculated. (Author)

Naval Research Lab., Washington, D. C.
SYNERGISTIC SURFACE TENSION EFFECTS FROM MIXTURES OF FLUORINATED ALCOHOLS WITH CONVENTIONAL WETTING AGENTS, by Marianne K. Bernett and W. A. Zisman. Interim rept. 20 Oct 60, 18p. 27 refs. NRL rept. 5556.
Order from LC mi$2.40, ph$3.30 PB 150 619

Aqueous solutions of any single, conventional hydrocarbon derivative have surface tensions which never go below 26 to 27 dynes/cm, but certain synergistic mixtures of such wetting agents will depress the surface tension of water to around 22 to 24 dynes/cm. This investigation has demonstrated that small quantities of highly fluorinated, insoluble, alcohols, when added to conventional wetting agents, become solublized in the micelles of the latter and can thus lower the surface tension of water well below a value obtainable by any mixture of unfluorinated compounds. These low surface tension values represent the closest possible packing of the fluorinated alcohol when adsorbed at the water/air interface. Where the solubilizing agent is not sufficiently water-soluble, an increase in the solvent power of the continuous phase can be effected by adding a mutual solvent; the fluoro alcohol can then be solubilized to become effective in generating low surface tensions. Under the best conditions synergistic systems were produced having surface tensions of 15.2 dynes/cm at 25°C if a perfluoroalcohol was used and 19.9 dynes/cm if an ω-monohydroperfluoroalkyl alcohol was used. (Author)

Physics Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
RADIOCHEMICAL PRODUCTION AND FATE OF FREE RADICALS, by Roger E. Rondeau. Rept. for Mar-June 60 on Materials Analysis and Evaluation Techniques. Aug 60, 28p. 31 refs. WADD Technical rept. 60-544.
Order from OTS $0.75 PB 171 310

This report represents an effort to interpret and correlate to a limited extent, the many physico-chemical phenomena of radiation chemistry in terms of elementary free radical processes. (Author)

Rochester U., N. Y.
THE FLUORESCENCE OF SULFUR DIOXIDE, by Kenneth F. Greenough. Technical rept. no. 1 on Contract Nonr-(668)15. 1 Feb 60, 61p. 30 refs. AD-232 410.
Order from LC mi$3.90, ph$10.80 PB 153 158

The fluorescence spectrum of SO_2 was investigated. In the gas phase, SO_2 molecules raised to the second excited electronic state by absorption of 2700 to 3100 A radiation undergo fluorescence transitions to the ground state. Resonance fluorescence bands from 2800 to 3100 A superimposed on a continuous spectrum extending beyond 4000 A are both associated with transitions from

the zero and excited vibrational levels of the excited state. No fluorescence was observed from the first excited electronic state by irradiation of SO_2 molecules with 3400 to 3900 A light. The fluorescence spectrum of solid SO_2 at 77° K excited by 2400 to 3500 A radiation, is very similar to the gas phase spectrum. The intensities of the transitions from the first excited electronic state increase relative to those from the second excited electronic state as the pressure of SO_2 increases; this intensity change is ascribed to an enhancement of the internal conversion and thermal deactivation processes. The second excited electronic state is more sensitive to self quenching than the first excited electronic state, and the reverse is true for quenching by the foreign gases, CO_2, H_2, O_2, and He. Both excited electronic states are more sensitive to self-quenching than to foreign gas quenching. The mean lifetime of the first excited electronic state of solid SO_2 at 77° K is $0.4 < \tau < 0.6$ msec; the mean lifetime of the second excited electronic state extrapolated to zero SO_2 pressure is 0.042 msec.

Sheffield U. (Gt. Brit.).
THE MOLECULAR ARRANGEMENTS OF SOME COMPONENTS OF THE CHLOROPLAST, by F. W. J. Teale. Final technical rept. no. 2, 1 Jan-31 Dec 59, on Primary Photochemical Processes in Photosynthesis, Contract DA 91-[591]-EUC-[1006]. 20 Feb 60, 58p. 50 refs. AD-234 401.
Order from LC mi$3.60, ph$9.30 PB 149 658

Chlorophyll fluorescence in chloroplasts is sensitized by light absorbed by tryptophan residues in structural protein. In vitro measurements with the model system indole-chlorophyll suggest that energy transfer takes place by resonance coupling at an intermolecular separation of about 30 A in the chloroplast and does not involve complex formation. The degree of chlorophyll fluorescence quenching produced by a known fraction of non-fluorescent chlorophyll molecules indicates the migration of the singlet excited state amongst some 275 different molecules prior to trapping. Comparison with the observed fluorescence polarization suggest little preferred orientation in Chlorella. The photooxidation of chlorophylls in organic solvents is prevented by carotenoids, but pheophytins are unaffected, suggesting a possible carotenoid-chlorophyll linkage through the magnesium atom. Phospholipids prevent the dimerization of chlorophyll in vitro. A complex containing chlorophyll, fucoxanthol, and phospholipids can be extracted from brown algae, with fluorescence parameters similar to algae. (Author)

[Sheffield U. (Gt. Brit.)].
TEMPERATURE COEFFICIENTS OF ATOMS RECOMBINATION, by George Porter and J. Ashley Smith. Final technical rept. no. 2, 1 Jan-31 Dec 59, on Contract DA 91-591-EUC-988. 14 Jan 60, 61p. AD-234 394.
Order from LC mi$3.90, ph$10.80 PB 149 659

The methods described in the report of December 1958 (FTR No. 1) have been used to obtain rate constants and temperature coefficients of recombination of iodine atoms in the presence of various chaperon molecules. A theory of atom recombination has been developed, based on the equilibrium $I + M \rightleftharpoons IM$ (1) where I is the iodine atom and M the chaperon molecule, followed by $I + IM \rightarrow I_2 + M$ (2). The equilibrium constant of (1) is calculated by statistical mechanical methods using the experimentally measured "activation energy" to derive the heat of formation of IM. The rate constant of (2) is calculated by means of collision theory. The calculations yield values of A in the equation $k_0 = ATe^{-E/RT}$ which are in fair agreement with the experimental results for chaperon molecules whose rate constants differ by a factor of one thousand. The nature of the binding energy in IM is considered and it is concluded that charge transfer complex formation is probably of principal importance. Preliminary attempts to detect charge transfer spectra were unsuccessful in the gas phase but transient spectra which are probably of this type have now been observed in solution. (Author)

EARTH SCIENCES

Massachusetts U., Amherst.
GEOMORPHIC STUDIES OF THE PROVINCETOWN DUNES, CAPE COD, MASSACHUSETTS, by H. T. U. Smith (Master's thesis) and Curtis Messinger. Technical rept. no. 1 on Contract Nonr-2242(00). June 59, 79p. 58 refs. AD-220 653.
Order from LC mi$4.50, ph$12.30 PB 149 638

Climatology and Meteorology

Air Force [Cambridge Research Labs.] Bedford, Mass.
EXAMPLES OF PROJECT TIROS DATA AND THEIR PRACTICAL METEOROLOGICAL USE, by William K. Widger, Jr. July 60, 109p. 9 refs. GRD Research notes no. 38; GRD TN-60-470; AD-245 132.
Order from LC mi$5.70, ph$16.80 PB 152 684

This report released for sale to the public 6 Jan 61.

Selected pictures from the TIROS I meteorological satellite are shown and in many cases are compared to the concurrent synoptic maps. Examples of transmissions of TIROS data that were available for practical weather analyses are also illustrated. A brief discussion is given of the further research potential of these data and of the infrared meteorological data that are expected to be obtained from TIROS II. (Author)

Air Force Cambridge Research [Labs.] Bedford, Mass.
EXTREME VALUE STATISTICS IN METEOROLOGY: A METHOD OF APPLICATION, by Irving I. Gringorten. June 60, 72p. 25 refs. Air Force Surveys in Geophysics no. 125; AFCRC-TN-60-442; AD-245 023.
Order from LC mi$4.50, ph$12.30 PB 152 701

While there have been several treatises on the applications of extreme-value theory to design and operational problems, this Survey is written to present simpler procedures with unbiased results. Most previous applications have used Fisher-Tippett distributions exclusively, which admittedly are limiting forms

that are reached asymptotically. Other distributions, therefore, between the Gaussian and the Fisher-Tippett types are examined and applied herein. The relation of annual extremes of meteorological parameters to their hourly and daily distributions is also examined to see what might be gained from short records, especially the records of wind speeds. The latter require special treatment because the annual extremes of winds do not appear to be part of a larger homogeneous population of daily winds. (Author)

Air Weather Service, Scott AFB, Ill.
FORECASTERS' GUIDE ON AIRCRAFT ICING.
1 Oct 60, 55p. 56 refs. Air Weather Service Manual 105-39, supersedes AWSM 105-39, Jan 53; AD-245 726.
Order from LC mi$3.60, ph$9.30 PB 152 977

The definitions of types and intensities of icing are stated. The nature of the icing hazard, methods of combatting it, and physical and operational factors in ice formation are briefly reviewed. Data on distribution of icing in the atmosphere with time and space, synoptic situations, etc., are summarized. A selection of non-synoptic aids for icing forecasting derived from various empirical studies is presented and their utility discussed. A suggested outline of steps for integrating the above information and aids into a synoptic forecast procedure for forecasting icing is presented in the last chapter.

Chicago U., Ill.
BAHAMAS CIRCLE COMPUTATIONS. PART I. DESIGN OF THE EXPERIMENT, by F. Baer and J. Mihaljan. Rept. on Contract Nonr-212119. Jan 60, 14p. 2 refs. AD-232 181.
Order from LC mi$2.40, ph$3.30 PB 152 905

Contents:
A program for computation on the Bahamas circle by Ferdinand Baer
Smoothing of irregularly spaced discrete data on a circle by John Mihaljan

Cornell U., Ithaca, N. Y.
WINTER MICROCLIMATES OF IMPORTANCE TO ALASKAN SMALL MAMMALS AND BIRDS, by Harry McClure Johnson. Rept. on Contract AF 33(038)12764. Mar 57, 147p. 50 refs. AAL Technical rept. 57-2.
Order from LC mi$7.20, ph$22.80 PB 153 345

Winter microclimatic conditions at areas in the continental interior of Alaska, particularly near Fairbanks, Alaska, and at areas on the Arctic Slope of Alaska were measured and observed during the 1950-1951 and 1951-1952 winter periods. The microclimatic and macroclimatic conditions, consisting of changing fields and distributions of quantities, were approximately determined in the continental interior for a variety of habitat types at areas of valley lowland, adjoining hills, small depressions, and the Chena River channel. The determination of temperature fields was emphasized. The microclimatic and macroclimatic conditions were approximately determined for a variety of microclimatic and macroclimatic states and events in the several main microclimatic zones. Concurrent with the determinations of conditions of the physical environment observations were made concerning animal activity and the biotic environment. An attempt was made to determine the response of these animals to conditions in the several zones during the principal microclimatic states and events. The subnivean small mammals were dependent for survival upon the continuous existence of the warm subnivean microclimates. The small birds at times fed on seeds on the cold snow surface when it had temperatures of -60° to -70°F.

Hawaii Inst. of Geophysics, Honolulu.
NOTES ON THE METEOROLOGY OF THE TROPICAL PACIFIC AND SOUTHEAST ASIA, ed. by C. S. Ramage. Interim rept. on Contract AF 19(604)1942. Dec 59, 176p. 40 refs. AFCRC TN-60-216; AD-235 212.
Order from LC mi$8.10, ph$27.30 PB 149 668

Included in the report are:
Relationship of general circulation to normal weather over Southern Asia and the Western Pacific during the cool season, pub. in the Jnl. of Meteorology 9: 403-408, Dec 52.
The cool-season tropical disturbances of Southeast Asia, pub. in the Jnl. of Meteorology 12:252-262, June 55
Non-frontal crachin and the cool season clouds of the China Seas, pub. in the Bulletin of the American Meteorological Society 35: 404-411, Nov 54
Variation of rainfall over South China through the wet season, pub. in the Bulletin of the American Meteorological Society 33: 308-311, Sep 52
Diurnal variation of summer rainfall over East China, Korea and Japan, pub. in the Jnl. of Meteorology 9: 83-86, Apr 52.

Hawaii Inst. of Geophysics, Honolulu.
NOTES ON THE METEOROLOGY OF THE TROPICAL PACIFIC AND SOUTHEAST ASIA, by C. S. Ramage, ed. Interim rept. on Contract AF 19(604)1942. June 60, 181p. 98 refs. Air Force Surveys in Geophysics no. 126; AFCRC-TN-60-455.
Order from LC mi$8.40, ph$28.80 PB 152 613

This report is designed to supplement other texts on tropical meteorology. It makes use of new observational material and accords the synoptic features of the monsoons more attention than they have received in the past. Hints on analysis, and the uses of auxiliary charts and continuity are followed by a chapter on the physical geography of the Pacific and a gazetteer describing the locations and environments of observing stations. Chapter 3 tabulates monthly mean resultant winds, steadiness and other derived data at standard pressure levels for 34 sounding stations. Chapter 4, which broadly considers the climatology of the region, leads to more detailed discussions of the synoptic climatology of the tropospheric field of motion in the central Pacific (Chapter 5) and of the synoptic climatology of the China Seas and southeast Asia (Chapter 6). The final chapters are devoted to tropical cloud physics, local effects and aerial weather reconnaissance. (Author)
Included in the report are:
Relationship of general circulation of normal weather over southern Asia and the western Pacific during the cool season, pub. in Jnl. of Meteorology 9:403-408, Dec 52

The cool-season tropical disturbances of southeast Asia pub. in Jnl. of Meteorology 12:252-262, June 55
Non-frontal cracin and the cool season clouds of the China Seas, pub. in Bull. of the American Meteorological Society 35:404-411, Nov 54
Variation of rainfall over south China through the wet season, pub. in Bull. of the American Meteorological Society 33:308-311, Sep 52
Diurnal variation of summer rainfall over East China, Korea and Japan, pub. in Jnl. of Meteorology 9:83-86, Apr 52.

Imperial Coll., London (Gt. Brit.).
ACCRETION IN MIXED CLOUDS, by W. C. Macklin. Technical (Scientific) note no. 8 on Contract AF 61(052)254. July 60, 33p. 20 refs. AFCRC TN-60-459.
Order from LC mi$3.00, ph$6.30 PB 153 391

The rate of accretion of ice and the nature and structure of the ice deposited on a body moving in a supercooled cloud is affected by the presence of ice particles in the cloud; there are important implications to the growth of hailstones. (Author)

Imperial Coll. of Science and Tech., London (Gt. Brit.)
THE DENSITY OF HAILSTONES COLLECTED FROM A SUMMER STORM, by W. C. Macklin, E. Strauch and F. H. Ludlam. Technical (scientific) note no. 7 on Contract AF 61(052)254. June 60, 12p. 5 refs. AFCRC-TN-60-458.
Order from LC mi$2.40, ph$3.30 PB 152 775

Measurements of the densities of hailstones have been made by immersing the stones in a series of chilled liquids of varying densities. The densities of 169 stones (mass 0.1 to 17.3 grams) obtained from a single storm ranged from 0.875 to 0.912 ± .003 g cm^{-3}. Some aspects of the structure of the hailstones are discussed.

Imperial Coll. of Science and Tech., London (Gt. Brit.)
THE FALLSPEEDS OF HAILSTONES, by W. C. Macklin and F. H. Ludlam. Technical (scientific) note no. 6 on Contract AF 61(052)254. June 60, 23p. 8 refs. AFCRC-TN-60-457.
Order from LC mi$2.70, ph$4.80 PB 152 774

Measurements have been made of the speeds of ice objects resembling hailstones during free fall, and of the drag coefficients of such objects and of natural hailstones. It has been found that the drag coefficients range from those of spheres (about 0.45) to about 0.8, depending on the shape and surface characteristics of the stone. (Author)

McGill U. (Canada).
TEMPERATURE AND WIND FREQUENCY TABLES FOR NORTH AMERICA AND GREENLAND, VOL. I, JANUARY-JUNE, ed. by J. N. Rayner. Rept. on Contract DA 19-129-qm-1447. Aug 60, 278p. Arctic Meteorology Research Group Pub. in Meteorology no. 24.
Order from LC mi$11.10, ph$42.60 PB 152 952-1

McGill U. (Canada).
TEMPERATURE AND WIND FREQUENCY TABLES FOR NORTH AMERICA AND GREENLAND, VOL. II, JULY-DECEMBER, ed. by J. N. Rayner. Rept. on Contract DA 19-129-qm-1447. Sep 60, 278p. Arctic Meteorology Research Group Pub. in Meteorology no. 25.
Order from LC mi$11.10, ph$42.60 PB 152 952-2

Naval Ordnance Test Station, China Lake, Calif.
CURVED-EARTH HORIZONTAL-DISTANCE CALCULATOR FOR THE REDUCTION OF RAWIN-DETERMINED UPPER-WIND DATA, by Paul H. Miller. 15 July 60, 12p. NOTS TP 2513; NAVWEPS rept. 7094; AD-245 078.
Order from LC mi$2.40, ph$3.30 PB 152 699

A calculator incorporating earth-curvature corrections has been developed and constructed for use in the reduction of upper-wind data. The calculator determines horizontal distances of a target at known altitude (up to 40 km) and elevation angle (6 to 45 deg). (Author)

Naval Ordnance Test Station, China Lake, Calif.
EVALUATION OF A METHOD OF CIRRUS FORECASTING AT THE NAVAL ORDNANCE TEST STATION, by D. L. Farnham. 15 July 60, 18p. 7 refs. NOTS TP 2528; NAVWEPS rept. 7104.
Order from LC mi$2.40, ph$3.30 PB 152 700

A practical and objective method of forecasting cirrus cloudiness at the Naval Ordnance Test Station, China Lake, California, has been tested and evaluated. Results or using the method from October 1959 through May 1960 are shown. It is concluded that the method is accurate enough to use as a forecasting aid. (Author)

Naval Postgraduate School, Monterey, Calif.
THE DIURNAL TEMPERATURE WAVE IN A LAYERED ATMOSPHERE, by Louis D. Megehee, Jr. Master's thesis. 1959, 24p. 7 refs. AD-230 565.
Order from LC mi$2.70, ph$4.80 PB 153 064

The partial differential equation for heat diffusion is numerically integrated. A solution is obtained for the diurnal temperature variation with a bounded coefficient of eddy diffusivity which varies periodically with time and nonlinearly with height. The surface wave is represented by the sum of a diurnal and a semidiurnal harmonic wave. The results may be interpreted to apply over a fairly broad range of diffusivity values and height. With appropriate choices of the various parameters, reasonably good agreement is obtained between theoretical and observational values of amplitude reduction and phase lag. (Author)

Naval Postgraduate School, Monterey, Calif.
A GRAPHICAL-NUMERICAL PREDICTION OF THE 1000-MB SURFACE WITH NON-ADIABATIC WARMING by Yeh-Chun Wang. Master's thesis. 1959, 48p. 6 refs. AD-230 562.
Order from LC mi$3.30, ph$7.80 PB 153 063

A two-level graphical-numerical prediction model is extended so as to incorporate some orographical and non-adiabatic warming or cooling effects in a manner such that almost no extra work is added. The model is applied to several cases where non-adiabatic heat exchanges are pronounced. The resulting prognoses show a material improvement over a similar model which omits the non-adiabatic influence. (Author)

Norske Meteorologiske Institutt (Norway).
SIGNIFICANCE OF REGRESSION EQUATIONS DERIVED FROM SERIALLY CORRELATED DATA, AND A PROCEDURE OF SELECTING OPTIMAL PREDICTORS, by Jack Nordø. Technical note no. 1 on Contract AF 61(052)374. [1960] 21p. 8 refs. AFCRL-TN-60-613.
Order from LC mi$2.70, ph$4.80 PB 152 769

The significance of statistical parameters derived from serially correlated data is discussed and a procedure of selecting optimal predictors is proposed. It is suggested that this procedure will be more efficient than some of those being in operational use. (Author)

Pennsylvania State U. Mineral Industries Experiment Station, University Park.
MONTHLY MEAN 50 MB AND 100 MB CHARTS PRECEDING THE IGY, by Hans A. Panofsky. Final rept. Part 3 (of three parts) on Contract AF 19(604)2190. Aug 60, 130p. 2 refs. AFCRC-TR-60-240 (III).
Order from LC mi$6.30, ph$19.80 PB 152 930

Mean monthly maps of the lower stratosphere for the 24 months immediately preceding the IGY, July 1955 through June 1957. In addition, 50-mb and 100-mb charts are presented for the first two months of the IGY.

Weather Forecasting Research Center, U. of Chicago, Ill.
AN EXPERIMENT IN COMPUTATION OF PRECIPITATION, by Kaare Pedersen. Scientific rept. no. 2 on Contract AF 19(604)7230. Aug 60, 13p. 3 refs. AFCRL TN-60-669; AD-246 419.
Order from LC mi$2.40, ph$3.30 PB 153 046

In a recent paper Smebye (1957) showed that if the mean vertical velocity through a column and the temperature and humidity at a representative level were known, fairly accurate values of the precipitation could be computed. The purpose of the present paper is to try out this procedure by using the vertical velocities routinely provided by the Joint Numerical Weather Prediction Center, J. N. W. P., Washington, D. C.

Woods Hole Oceanographic Institution, Mass.
CLOUD PATTERNS IN HURRICANE DAISY, by Joanne S. Malkus, Claude Ronne, and Margaret Chaffee. Technical rept. #8 on National Science Foundation Grant no. 7368 and Contract [Nonr] 1721(00). Jan 60, 65p. 10 refs. Ref. no. 59-63; AD-232 742.
Order from LC mi$3.90, ph$10.80 PB 152 870

Data were collected on August 25, 26, and 27, 1958, during the incipient, deepening and mature days of Hurricane Daisy to provide a quantitative description of cloud patterns and their role in storm dynamics and processes. Nose camera films were taken at several flight levels from which cloud maps were constructed for each of the 3 days studies. Comparisons were made of cumulonimbus structure, eye-wall formation, extent and height of the cirrus shield, and location of rainbands for all 3 days. The outstanding result of this visual cloud mapping was the persistence of lines or spiral bands of cumulonimbus in the same relative coordinate position over 48 hr. (Author)

Frost Science

Army Snow, Ice and Permafrost Research Establishment, Wilmette, Ill.
BIBLIOGRAPHY ON SNOW, ICE AND PERMAFROST WITH ABSTRACTS. VOLUME XIV, ed. by Thomas E. Hughes. Jan 60, 252p. 999 refs. SIPRE rept. 12.
Order from OTS $3.00 PB 171 190

Deutscher Wetterdienst, Hohenpeissenberg (West Germany).
OBSERVATIONS AND ANALYSIS OF SNOW CRYSTALS FOR PROVING THE SUITABILITY AS AEROLOGICAL SONDE. II. SPECIAL STUDIES ON THE SEQUENCE OF SNOW CRYSTAL TYPES, ON HOAR-FROST CRYSTALS, by Johannes Grunow. Final rept. for 15 Jan 59-15 Jan 60 on Contract DA 91-591-EUC-1030, 01-1189-59. 15 Feb 60, 174p. 33 refs.
Order from LC mi$8.10, ph$27.30 PB 152 541

Each snowfall was submitted to a qualitative snow crystal analysis. For each observation term the shares of the different crystal forms contained in a snow sample were ascertained and presented in their temporal succession. In order to bring the results of these analyses into relation with the weather situation, cases with warm front precipitation, cold front precipitation, and also cold air and warm air in interplay were selected. The synoptic analysis of these days was carried out by weather maps and aerological cross sections; and by help of the T_a-s diagram of Nakaya, the state of saturation was brought into relation with the growing conditions of the different forms of snow crystals as known from laboratory investigations. The purpose of these comparative investigations was to derive sequences of snow crystal types that can be considered characteristic for certain weather situations. From the analysis of operations with only one certain crystal type dominating, the particular weather situation of such cases was derived. One case of dendrites, falling from a thin cloud stratum, resting upon the place of observation, offered the opportunity to study microcrystals in their generating zone. Special observations of hoar-frost offered the opportunity to study the growing conditions of ice crystals under natural conditions at the place of their origin. The different forms were put down in a new morphological classification of hoar-frost crystals in dependence on the temperature ranges of their generation. (Author) (See also PB 143 108)

Geodesy

Institute of Geodesy, Photogrammetry and Cartography, Ohio State U. Research Foundation, Columbus.
APPLICATION OF DOUBLE FOURIER SERIES TO COMPUTING GRAVITY ANOMALIES AND OTHER GRAVIMETRICAL QUANTITIES AT HIGHER ELEVATIONS FROM SURFACE GRAVITY ANOMALIES, by Chuji Tsuboi. Rept. no. 2 on Contract AF 19(604)1963. Oct 59, 21p. Technical paper no. (716)-7; AFCRC-TN-59-624; AD-230 098.
Order from LC mi$2.70, ph$4.80 PB 152 799

The double Fourier series method was developed for computing gravity anomalies at higher elevations, starting from given surface gravity anomalies. As an example of its application, the method was used to deduce gravity anomalies at an elevation of 15.9 km above a portion of Sweden. (Author)

Institute of Geodesy, Photogrammetry and Cartography Ohio State U. Research Foundation, Columbus.
APPLICATION OF $\frac{\sin x}{x}$ AND OTHER SIMILAR FUNCTIONS TO COMPUTING GRAVITY ANOMALIES AT HIGHER ELEVATIONS, STARTING FROM GIVEN SURFACE GRAVITY ANOMALIES, by Chuji Tsuboi. Rept. no. 3 on Contract AF 19(604)1963. Oct 59, 22p. Technical paper no. (716)-8; AFCRC-TN-59-625; AD-230 242.
Order from LC mi$2.70, ph$4.80 PB 152 800

The functions $\frac{\sin x}{x}$ and $(\frac{\sin x}{x})^2$ were used for computing gravity anomalies at higher elevations, starting from given values of surface gravity anomalies. These represent 2 different interpolation methods for evaluating gravity anomalies between given values. Also a linear interpolation method was tried. Gravity anomaly distributions at an elevation of 46.7 km above the profile no. 17 of Vening Meinesz across the East Indies as deduced by the three methods agree within several milligals. (Author)

Geography

California U., Berkeley.
THE GEOGRAPHY OF THE SAVANNAS OF INTERIOR HONDURAS, by Carl L. Johannessen. Rept. on Contract Nonr-222(11). 1959, 293p. 210 refs; AD-231 473.
Order from LC mi$11.10, ph$45.60 PB 152 892

California U., Berkeley.
HISTORICAL ECONOMIC GEOGRAPHY OF THE SOUTHWEST PENINSULA OF HAITI, by John M. Street. Rept. on Contract Nonr-222(11). 1960, 486p. 205 refs; AD-231 450.
Order from LC mi$11.10, ph$74.10 PB 152 893

Oceanography

Lamont Geological Observatory, Palisades, N. Y.
UNDERWATER PHOTOGRAPHY AND CORE SAMPLING ON PLANTAGENET BANK, by John Ewing and Archie Roberts. Rept. on Contract NObsr-64547 and Technical rept. no. 1 on Contract Nonr-266(65). Jan 60, 30p. CU-1-60-Nonr 266(65); AD-234 110.
Order from LC mi$2.70, ph$4.80 PB 152 908

Three series of underwater photographs and 4 core samples were taken on the southwestern slope of Plantagent Bank between the crest and the 500-fathom contour, in the close neighborhood of 31° 57'N and 65° 13'W. The Lamont multiple-shot model camera was used. The light source was located about 5 ft above the bottom and the camera about 8 ft. At this distance the camera's field of view is an area about 6 ft x 4 ft. The photographs are mounted so that the light source is at the bottom. The ewing piston corer was used with a 20-ft sampling tube, 1400 lbs in weight, with a free fall of 10 ft. With this amount of weight and free fall, this apparatus is capable of taking a core as long as 70-80 ft in normal ocean sediments. The longest core obtained in this series was about 11 ft which gives an indication of the type of bottom found on the bank. (Author)

Marine Lab., U. of Miami, Coral Gables, Fla.
OCEANOGRAPHIC SURVEY OF THE TONGUE OF THE OCEAN, VOLUME I, by F. F. Koczy, F. Chew and others. Technical rept. for 6 Aug-26 Sep 58 on Operation TOTO, Contract N140(122)65617B. 26 Sep 58, 169p. ML-2112.
Order from LC mi$7.80, ph$25.80 PB 153 625

This report released for sale to the public 18 Jan 61.

The TOTO is a "graben-like" embayment on the Great Bahama Bank. It is connected with the Atlantic Ocean by the northern entrance and by Northeast Providence Channel. The slopes of the edge are rather steep, in the upper 100-200 fathoms, and consist primarily of coral rock. From about 200 fathoms to the deeper part, the slope is more gentle and consists of calcareous ooze: foraminifera, pteropods, and oolites; the bottom is completely flat. The depth of the TOTO increases gently from 700 fathoms at the Cul-de-Sac in the southern end to 1500 fathoms at the northern entrance. It is suspected that sediment moves slowly in the TOTO toward the Atlantic Ocean. Sedimentary material is supplied primarily by restricted slides off the edge. Precipitation in this region reaches two maxima, in June and in October; showers can be rather heavy during the summer months. Winds are gentle during the summer, but heavy winds can be expected from October to March. The water masses of the TOTO are an integral part of the waters in the Atlantic Ocean east of the Bahama Islands. The surface water, to about 150 m., is markedly influenced by the water from the surrounding banks. Submarine daylight measurements in the surface water show the same clarity as is found in tropical waters of oceanic origin. The general circulation in the TOTO is very sluggish and primarily wind-driven. Internal waves and seiches have been detected and were most pronounced during the winter time. Currents, measured

in the TOTO, are from 0.2 k. to 0.1 k. On the edge, the maximum current is 0.5 k. In the bights and creeks the tidal current may reach 5 k. The TOTO can be characterized as a small model-ocean. (Author)

Narragansett Marine Lab., U. of Rhode Island, Kingston.
BIOLOGICAL PRODUCTIVITY PROJECT, by David M. Pratt. Annual progress rept. for 1 Jan-31 Dec 59 on Contract Nonr-396(03). Jan 60, 5p. Ref. no. 60-1; AD-235 398.
Order from LC mi$1.80, ph$1.80 PB 152 907

Brief summaries of published work and current progress in research on phytoplankton, epibenthos, bacteria-plankton relationships, and special studies of off-shore plankton. (See also PB 145 209)

Washington U., Seattle.
COBB SEAMOUNT, A DEEP-SEA FEATURE OFF THE WASHINGTON COAST, by Thomas F. Budinger and Betty J. Enbysk. Technical rept. no. 60 on Contracts Nonr-477(10) and Nonr-477(01). Mar 60, 89p. 117 refs. Ref. no. 59-6; AD-238 479.
Order from LC mi$4.80, ph$13.80 PB 148 426

Cobb Seamount is a deep-sea feature located 270 nautical miles west of Gray's Harbor, Washington (46°46.4' N and 130°48.8' W). The topography, geology, biology, and hydrography of the mountain were investigated by the research vessel, M. V. Brown Bear; 500 mi of soundings, 34 bottom samples, 25 hydrographic stations, and other observations were taken. This submarine mountain rises from a base at 1,500 fathoms below the sea surface to within 18.5 fathoms of the surface and comprises an area of 240 square naut mi. The average slopes of 12° are indented by three prominent terraces at 500, 100, and 45 fathoms. From the 45-fathom terrace rises a 160-ft pinnacle apparently composed of shells and characterized by a flat top and 45° slopes. The hydrographic observations indicate that there are no anomalies in the water structure of current pattern which might be attributed to the influence of the mountain. A rotary current with both semidiurnal and inertial constituents was observed. The geostrophic flow during four periods of observations was 0.1 knot setting southeast. The water mass is dominantly Subarctic water mixed with 10-20 percent Equatorial Pacific water. (Author)

Physics of the Atmosphere

Advanced Electronics Center, General Electric Co., Ithaca, N. Y.
A DETAILED DESIGN STUDY FOR A TOPSIDE IONOSPHERIC SOUNDER. VOLUME I, by Leonard C. Humphrey. Scientific rept. no. 1 on Contract AF 19(604)7221. 15 Sep 60, 199p. 40 refs. AFCRL TN-60-1125(I)
Order from LC mi$8.70, ph$30.30 PB 153 050

This report describes the investigations for the design of a satellite-borne ionospheric sounder. The report is divided in two volumes; the first describes the scientific considerations which influence the measurements, the various requirements of the equipment, their feasibility, configuration in an instrumented satellite package, and ground support complex requirements. (Author)

Antenna Lab., Ohio State U. Research Foundation, Columbus, Ohio.
PRELIMINARY ANALYSIS OF METHODS FOR TEMPERATURE DETERMINATION AT ALTITUDES ABOVE 120,000 FEET, by T. G. Hame, W. H. Peake and others. Rept. on Temperature Measurements at Altitudes above 120,000 ft. Contract DA 36-039-sc-84516. 25 May 60, 49p. 10 refs. Rept. 973-2; AD-242 206.
Order from LC mi$3.30, ph$7.80 PB 152 669

An analysis is given of the feasibility of a variety of methods for temperature determination at altitudes above 120,000 ft. It is concluded that several of these methods (e.g., rocket-grenade, falling sphere, pressure instrumentation) are developed to the point where they can yield accuracies of ±5°K with an altitude resolution that is typically of the order of 1 km, at altitudes up to about 275,000 ft. Between this altitude and about 400,000 ft, present methods (mostly based on pressure measurements) are not satisfactory. Above 400,000 ft, proposed methods based on determination of kinetic temperatures in the ionosphere are discussed, but these methods are fully verified experimentally. (Author)

Electrical Engineering Research Lab., U. of Texas, Austin.
SINGLE AND DUAL CAVITY MEASUREMENTS OF GROUND AND AIRBORNE INDEX OF REFRACTION FLUCTUATIONS AT 400 MCPS. by G. B. Walker. Rept. on Contract AF 19(604)2249. 15 Sep 60, 45p. 6 refs. Rept. no. 6-38; ERD TN-60-975; AD-245 509.
Order from LC mi$3.30, ph$7.80 PB 152 951

This report gives the results of measurements of variations in the index of refraction of the atmosphere made at this Laboratory in February, April, and May 1960. Data were obtained by use of 403 mcps refractometers. These data include difference index of refraction measurements as a function of cavity spacing, single and dual cavity index of refraction as a function of height on a 280 ft. tower, and single and dual cavity index of refraction as a function of altitude on a light aircraft. All data were recorded on an Ampex FR-100A Magnetic-Tape recorder and a Brush recorder type BL-202. These data were later transcribed on an Ampex 306-2 Magnetic Tape recorder to perform power density spectra analysis. These power density spectra are included. (Author)

Ionosphere Research Lab., Pennsylvania State U., University Park.
THE EFFECTIVE RECOMBINATION COEFFICIENT OF AN IONOSPHERE CONTAINING A MIXTURE OF IONS, by S. A. Bowhill. Scientific rept. no. 141 on Ionospheric Research, Contract DA 36-061-ORD-577. 15 Nov 60, 27p. 16 refs. AD-245 060.
Order from LC mi$2.70, ph$4.80 PB 152 697

The effective recombination coefficient of the normal ionosphere may be evaluated from the nocturnal variation of ionization density; from the rate of change of ionization during a solar eclipse; or from the "sluggishness" of the ionization, as exhibited in its diurnal variation. These three methods are found to give widely different results, at any one height in the ionosphere. It is shown that an ionosphere containing a mixture of several ion species with different recombination coefficients, gives adequate explanation of these discrepancies. Formulae are presented for the effective recombination coefficient for this model. A consideration of existing knowledge of ionization processes in the E-region suggests that the ions concerned may be those of molecular oxygen and nitric oxide; the latter being produced by ion-atom interchange between nitrogen molecules and atomic oxygen ions. The nocturnal E-region should then consist primarily of NO^+ ions. (Author)

Ionosphere Research Lab., Pennsylvania State U., University Park.
LOW FREQUENCY RADIO STUDIES OF APPARENT IONOSPHERIC MOTIONS, by G. S. Sales. Scientific rept. no. 131 on Ionospheric Research, Contract AF 19(604)4563. 1 Apr 60, 211p. 59 refs. AFCRC TN-60-483; AD-245 061.
Order from LC mi$9. 60, ph$33. 30 PB 152 696

An investigation of ionospheric motions using low frequency radio waves is described. This work presents the experimental results of this program and the development of a theory for the explanation of these observations. The experimental apparatus and the method of analysis used to obtain values of drift and random velocities are discussed in detail. A study is made of the sampling errors associated with the computation of correlation coefficients and this work is then applied to specific problems associated with the analysis of motions in the ionosphere. The results are presented and estimates of the accuracy are given for the quantities analyzed. Finally, a theory developed in terms of hydrodynamic waves in the ionosphere, to explain the observations of this work and the work of other investigators using medium frequency radio waves. (Author)

Naval Research Lab., Washington, D. C.
THE MEASUREMENT OF WATER-VAPOR DISTRIBUTION IN THE STRATOSPHERE, by H. J. Mastenbrook and J. E. Dinger. 16 Nov 60, 38p. 18 refs. NRL rept. 5551.
Order from LC mi$3. 00, ph$6. 30 PB 150 618

The development of a dew-point radiosonde has been integrated with a series of balloon flights extending over a period of two years. This endeavor has sought to establish the reliability of the instrument by an appraisal of its performance and the consistency of the flight data obtained. The instrument incorporates the optical-electronic-thermal servo loop commonly used in automatic dew-point instruments and operates to control the temperature of a mirror surface such that a water or ice deposit is in equilibrium with the vapor in the air being sampled. The temperature of the mirror is measured and telemetered to give the frost point. Special attention has been given to problems related to contamination of the sample by extraneous moisture and to condensate characteristics. The data from a total of eleven flights are included. The flight data have been critically evaluated to point up problem areas in the instrument and flight procedures and to determine what flights have yielded valid data concerning the water distribution in the stratosphere.

Upper Air Research Lab., U. of Utah, Salt Lake City.
CHARACTERISTICS OF LOW FREQUENCY ANTENNAS FOR ROCKET APPLICATIONS, by Gayle Fred Miner. Scientific rept. no. 4 on Contract AF 19(604)2227. 12 Aug 60, 58p. 15 refs. AFCRL-TN-60-657; AD-244 708.
Order from LC mi$3. 60, ph$9. 30 PB 152 623

An investigation was conducted on rocket-borne dipole antennas used for ionospheric research in the frequency range of 3 to 12 mc. The description of a test facility for measuring the impedance and field intensity of balanced dipole antennas using a ground plane is given. The facility allows the effect of the rocket body on antenna performance to be included in the antenna measurements. Results are given of an initial investigation to determine the effect of dipole length on the antenna input impedance. Methods are discussed for the electrical lengthening of a dipole antenna and for the elimination of the capacitive reactance component of the impedance of a dipole of electrical length less than $\lambda/4$. Experimental impedance data are presented for the following three methods: (1) capacitive top-loading, (2) base series inductance tuning, and (3) distributive inductive loading. Field intensity measurements on a base series inductance tuned antenna and a distributed inductance loaded antenna at 7. 2 mc are given. The construction details of a distributively loaded antenna are given, including the use of ferrite materials to allow an antenna to be tuned to a prescribed frequency. The description and results of a saturation test performed on the ferrite tuning core material are given. (Author)

ENGINEERING

Air Force Cambridge Research [Labs.] Bedford, Mass.
ESTIMATING SOIL MOISTURE AND TRACTIONABILITY CONDITIONS FOR STRATEGIC PLANNING. PART I. GENERAL METHOD. PART 2. APPLICATION AND INTERPRETATIONS, by C. W. Thornthwaite, J. R. Mather and others. Mar 58, 62p. 19 refs. Air Force Surveys in Geophysics no. 94; AFCRC-TN-58-201; AD-146 789.
Order from LC mi$3. 90, ph$10. 80 PB 153 884

This report released for sale to the public 19 Jan 61.

Soil moisture content is the most important factor in determining bearing capacity, shearing strength, and stickiness of soils; or, in other words, the tractionability of a soil. Knowledge of the balance between incoming precipitation and outgoing evapotranspiration and surface and subsurface runoff provides information on the moisture content in the soil. A method is presented for computing soil moisture conditions by

means of a simple bookkeeping procedure utilizing readily available climatic data. It is thus possible to obtain detailed information on the water balance and its distribution in the ground at any time in a desired area on either a monthly or a daily basis. From a discussion of the factors affecting soil tractionability and the influence of moisture on tractionability, it is possible to define different classes of the state of the ground in physical terms, estimate their probability of occurrence, prepare maps of monthly average soil moisture conditions, and correlate these conditions with tractionability requirements. (Author)

Battelle Memorial Inst., Columbus, Ohio.
CORROSION OF METALS IN SEA WATER, by Frederick W. Fink. Rept. on Contract no. 14-01-001-182. Dec 60, 62p. 152 refs. Office of Saline Water Research and Development Progress rept. no. 46.
Order from OTS $1.75 PB 171 344

Contents:
Corrosivity of sea water: the nature of corrosion; corrosive ions in sea water; conductance and salt concentration; oxygen and temperature; crevice and pitting attack; velocity; heat transfer; stress; galvanic couples
Problems associated with heating sea water
Performance of metals in saline water: steel; cast iron; wrought iron; aluminum and its alloys; copper; brasses and bronzes; cupro nickels; Monel; stainless steels; titanium; special alloys.

Aeronautical Engineering

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
AN EXPERIMENTAL INVESTIGATION OF STALL FLUTTER OF A MODEL HELICOPTER ROTOR IN FORWARD FLIGHT, by Norman D. Ham. Rept. on Contract Nonr-1841(58). 15 Mar 60, 47p. 8 refs. Technical rept. 86-1; AD-236 709.
Order from LC mi$3.30, ph$7.80 PB 147 554

Stall flutter of a model helicopter rotor in simulated forward flight was investigated. Stall flutter was found to occur in all forward flight cases involving appreciable blade stall, and consisted almost entirely of blade motion in the torsional mode. Stall flutter amplitude was found to be dependent on such parameters as blade chordwise C. G. position, blade torsional damping, blade torsional frequency, and the degree of stall occurring over the rotor disc. The results of the study indicate that more information is required regarding the torsional aerodynamic damping of stalled rotating blades (Author)

Avco Corp., Nashville, Tenn.
DESIGN, DEVELOPMENT AND FABRICATION OF A LIGHT WEIGHT AIRFRAME. Monthly progress rept. no. 5, Sep 60, on Contract DA 33-008-ORD-1968. [1960] 12p. AD-245 703
Order from LC mi$2.40, ph$3.30 PB 152 967

In the explosive forming development, four experimental charges have been tried on explosive forming the skins. These have proven unsuccessful due to a poor weld at the seam of the cone shaped blank. A 7075 aluminum alloy material has been temporarily substituted for X2020 material for explosive forming development in determining placement of charge and tool tryout due to the unavailability of X2020 material in small quantities. After establishing the basic parameters required for explosive forming, final tests will be conducted using X2020 material. Detail parts fabrication is in progress. All detail parts required for Unit No. 1 have been completed with the exception of the formed skins. (Author) (See also PB 152 343)

Bell Aircraft Corp., Buffalo, N. Y.
SUPERSONIC AEROELASTIC EFFECTS ON STATIC STABILITY AND CONTROL. PART III. AEROELASTIC INTERACTION, by Vincent W. Donato. Rept. on Contracts AF 33(616)3577 and AF 33(616)6067. July 60, 371p. 53 refs. WADC Technical rept. 58-95, Part III.
Order from OTS $5.00 PB 171 192

Static aeroelastic interaction equations are derived in matrix form for wing-aileron lifting surfaces, considering the wing and aileron being independently flexible, and the wing and aileron as a single structural assemblage. The equations are stated in general form so as to accept inputs in the form of aerodynamic and structural deformation influence coefficient matrices. Closed form and series solutions for the equations are presented. From these solutions expressions are developed for the flexible to rigid ratios of lifting pressure, span loadings, and aerodynamic center locations. Matrix expressions for the flexible to rigid ratio of pertinent derivatives demonstrate the effects of flexibility on stability and control. Inertia effects are also included. Sample problems illustrate the use of the derived equations in an aeroelastic analysis. (Author)

Crysler Corp., Detroit, Mich.
MODEL DESIGNATION VZ-6-CH SERIAL NO. 58-5506. Final engineering rept. on Chrysler Aerial Research Vehicle, Contract DA 44-177-tc-448. 29 Feb 60, 202p. 6 refs. AD-234 515.
Order from LC mi$9.30, ph$31.80 PB 153 624

This report released for sale to the public 10 Jan 61.

This report covers the design, fabrication, and tethered flight testing of a two duct, vertical take-off aerial research vehicle. Preliminary design work included small scale wind tunnel testing, full scale static test bed experimentation, stability analysis, and an analog computer flight simulation. The ducted propellers of the flight research vehicle were 8-1/2 feet in diameter; the vehicle was powered by a 360 hp piston engine. Flight control was achieved by a system of hinged vanes; the propeller blades were of a fixed pitch, non-articulating design. Results of tethered flight tests indicate that thrust was adequate to hover a vehicle of 2200 pounds gross weight. Control was marginal about all three axes; control on the ground at the moment of lift-off was inadequate, indicating that further development work on the control system is required. (Author)

Curtiss-Wright Corp., Santa Barbara, Calif.
HYPERSONIC FREE FLIGHT RESEARCH. PART II: INVESTIGATIONS OF HEAT TRANSFER AND AERODYNAMIC STABILITY, by O. R. Burggraf. Rept. on Contract AF 33(616)5104. July 60, 93p. 20 refs. WADD Technical rept. 59-708, Part II.
Order from OTS $2.25 PB 171 195

A series of eight free flight experiments have been conducted with the HTV-1 Hypersonic Test Vehicle for the purpose of studying the aerodynamic heat transfer characteristics of blunted cones as well as the flight dynamic characteristics of the vehicle itself. The vehicle, instrumentation system, and typical flight conditions are discussed briefly. Results of the flight tests are discussed, both with regard to heat transfer and aerodynamic characteristics and with regard to the limitations of the instrumentation system. (Author) (See also PB 171 194)

Directorate of Flight and All-Weather Testing, Wright-Patterson AFB, Ohio.
THE EFFECT OF FROST ON THE TAKE-OFF PERFORMANCE OF F-86 AND B-47 AIRCRAFT, by Jerry Hanjian. May 56, 24p. WADC-TN-56-187.
Order from LC mi$2.70, ph$4.80 PB 153 630

This report released for sale to the public 12 Jan 61.

This report presents quantitative results of take-off performance flight tests on F-86 and B-47 model aircraft with frost on the lifting surfaces. No significant change was found in the take-off performance of these aircraft from the point of brake release through initial climb under the variables of frost intensity and gross weights tested during the winter season of 1955-1956. Information of a qualitative nature is also presented for an RB-66A and B-52B aircraft. (Author)

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
COMPUTERS FOR AIRCRAFT SIMULATION, by Mark E. Connelly. Rept. on Contracts N5ori-07895 and N61339-45. 15 Dec 59, 115p. 124 refs.
Rept. 7591-R-2.
Order from LC mi$6.00, ph$18.30 PB 152 885

This report is the concluding work on a one-year study of the equations of motion and the computing techniques used in the aerodynamics computer section of Operational Flight Trainers. A review of the characteristics of basic 60 cps, 400 cps, and DC analog computing techniques is presented with emphasis on the relative applicability of these techniques to the unique requirements of the OFT problem. It is concluded that 400 cps techniques would give more than acceptable performance and would offer substantial advantages with respect to cost, size, maintenance and power consumed. In conclusion, several suggestions are made concerning OFT acceptance procedures, the matching of the OFT to the actual aircraft, and standardization. (Author)

Foster, John J. Mfg. Co., Costa Mesa, Calif.
STRESSKIN PROGRAM (RESISTANCE WELDED STAINLESS STEEL HONEYCOMB SANDWICH PANEL) by Paul E. Harrison and L. F. Elliott. Final rept. for 25 Apr 58-25 Sep 59 on Contract Noa(s) 58-659-c. 24 Dec 59, 125p. 4 refs.
Order from LC mi$6.30, ph$19.80 PB 149 718

Manufacturing research, development, and pilot-line production of welded steel honeycomb core material and composite sandwich panel, referred to in this report as STRESSKIN, a trade name for an all-welded honeycomb sandwich panel. Development of machinery and equipment for producing STRESSKIN; specifically, face sheet to core ribbon flange welding, node welding, welding controls, node welding electrode tips, face sheet welder electrode strips, flanged core ribbon forming, inspection of weld, cleaning stainless steel panels, drying of panels, and stress analysis of panels All resistance welded honeycomb sandwich panels can be manufactured with high quality and in quantity, at a relatively low cost.

McDonnell Aircraft Corp., St. Louis, Mo.
UNLOADED ROTOR COMPOUND HELICOPTER. LIGHT VTOL TRANSPORT AIRCRAFT STUDY. Rept. on Contract DA 44-177-tc-588. 1 Feb 60, 136p. 73 refs. Rept. no. 7064; AD-232 716.
Order from LC mi$6.90, ph$21.30 PB 149 666

This report gives the results of a design study of a VTOL transport aircraft with a VTOL payload of approximately two tons at 6000 feet 95°F out of ground effect hovering, and with radii of action from 200 to 500 nautical miles. The study is centered around the XV-1 unloaded rotor type of VTOL aircraft which was extensively flight-tested by McDonnell and Air Force pilots during 1955-57. Recommendations are made on light VTOL transport requirements. A justification of the selection for unloaded rotor design parameters is given. A spectrum analysis for a gross weight range of 15,000 to 60,000 pounds shows the effects of size on payload and radius of operation. Also shown are the effects of take-off atmospheric design requirements. The recommended Army light VTOL transport of the XV-1 type has about 30,000 pounds design gross weight and can be powered by any of three different gas turbines; T58-GE-8, T55-L-7, or T64-GE-2. Given are dimensional data, description of systems, performance, flying qualities, structural approach, dynamics, and weights. Some operational variables are treated. Maintenance and operating costs are given for the recommended aircraft. (Author)

Minnesota U., Minneapolis.
SUPERSONIC SPEED FLUTTER ANALYSIS OF CIRCULAR PANELS WITH EDGES ELASTICALLY RESTRAINED AGAINST ROTATION, by L. E. Goodman and Jasti Venkata Rattayya. Rept. for Jan-Dec 59 on Metallic Materials, Contract AF 33(616)6828. Aug 60, 85p. 22 refs. WADD Technical rept. 60-309.
Order from OTS $2.25 PB 171 199

The flutter problem is formulated, in terms of small-deflection plate theory, for a flat circular panel with edges elastically restrained against rotation. The panel is taken to be subjected to isotropic tension or compression in its middle plane. Linear piston theory is used to predict the aerodynamic load on the vibrating panel due to a supersonic compressible flow passing its upper surface. Results of the analysis predict panel

thickness necessary to prevent flutter as a function of air speed, elevation, and degree of edge fixity. Investigations of aerodynamic and structural damping effects and the influence of mid-plane load are included. (Author)

Northrop Corp., Hawthorne, Calif.
EFFECTS OF TEMPERATURE-TIME-STRESS HISTORIES ON THE MECHANICAL PROPERTIES OF AIRCRAFT STRUCTURAL METALLIC MATERIALS. PART II. STRESSED EXPOSURE OF 7075-T6, by C. D. Brownfield and D. M. Badger. Rept. for May 58-Sep 59 on Materials Analysis and Evaluation Techniques, Contract AF 33(616)5769, continuation of Contract AF 33(616)3028. Sep 60, 113p. 11 refs. NOR 60-16; WADC Technical Rept. 56-585, Part II.
Order from OTS $2.50 PB 171 328

A study has been made on the problem of predicting strength of a hardened metal alloy after subjection to variable thermal and stress environments severe enough to cause permanent loss of properties. Methods have been developed for predicting tensile ultimate, tensile yield, and compressive yield strengths of 7075-T6 aluminum alloy after single or multiple exposure to various temperature and stress exposure conditions. Test results have been used to establish the validity of the Larson-Miller exposure parameter to correlate residual strength after stressed and unstressed single multiple exposures. (Author) (See also PB 131 520)

Princeton U., N. J.
AN EXPERIMENTAL INVESTIGATION OF HELICOPTER STABILITY CHARACTERISTICS NEAR HOVERING FLIGHT USING A DYNAMICALLY SIMILAR MODEL, by Robert M. Bennett and Howard C. Curtiss, Jr. Rept. on ALART Program, Contracts DA 44-177-tc-524 and Nonr-1858(11). July 60, 103p. 12 refs. Aeronautical Engineering rept. no. 517.
Order from LC mi$5.70, ph$16.80 PB 152 831

This report presents the results of experiments conducted with a dynamically similar scale model of a helicopter near hovering flight, to determine the quasi-static stability derivatives in terms of fuselage variables. The stick-fixed transient response in two degrees of freedom, horizontal velocity and fuselage pitch angle, was measured. The apparatus consisted of a carriage-track system constraining the model to motions in a vertical plane, and a positioning servomechanism slaving the carriage to the horizontal motion of the model. Longitudinal forces and pitching moment were measured for small velocity increments about hovering with the hovering trim control settings and fuselage attitude to determine static stability. Methods for determining the significant stability derivatives near hovering, the damping in pitch ($C_{M_{DOT}}$) and the velocity stability (C_{M_U}) from the dynamic data are derived, applied and compared. A complete discussion of the model and testing techniques used in the experiments is included, as well as experience with downwash recirculation and pitch-lag oscillations encountered during the tests. (Author)

Princeton U., N. J.
REQUIRED LATERAL HANDLING QUALITIES FOR HELICOPTERS IN LOW-SPEED INSTRUMENT FLIGHT, by Joseph H. Goldberg and Robert C. Gangwish. Rept. of Contract DA 44-177-TC-524. Feb 60, 42p. 11 refs. Aeronautical Engineering rept. no. 496.
Order from LC mi$3.30, ph$7.80 PB 152 625

The reported investigation was conducted in order to establish the requirements for, and factors influencing, the lateral handling qualities of helicopters. Flying qualities were studied using a number of appropriate pilot subjects in a test program on a variable stability helicopter. Dynamic lateral characteristics were varied over a broad range to define bases for suitable handling qualities. Data on each configuration were obtained in the form of pilot commentary and related helicopter stability and control characteristics. Both visual and instrument flight problems were considered, with test conditions limited to low-speed level flight. Over forty different stability configurations were tested by experienced helicopter test pilots. A latter phase of the program was conducted in a more intensive manner by a single pilot after it was established that reasonable consistency of results existed within the pilot group. Testing included the recording of detailed commentary as well as an over-all evaluation represented by a numerical rating. Analysis of test results indicated a number of areas of importance in helicopter lateral handling characteristics. The principal factors were found to be the damping of the Dutch roll oscillatory mode, spiral damping, and the nature of control applications in turns. (Author)

Propulsion Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.
HOT GAS SURFACE EROSION STUDIES, by W. H. Mitchell and J. N. Wherry. Rept. for Jan-Apr 60. Aug 60, 22p. WADD Technical note 60-183; AD-241 779.
Order from LC mi$2.70, ph$4.80 PB 153 629

This report released for sale to the public 16 Jan 61.

The effect of jet exhaust impingement on several surfaces was observed using a YJ85-GE-3 turbojet engine for testing. The surfaces tested were sod, concrete, a sand-dirt-gravel mixture, and sod covered with landing mats. The velocities and temperatures of the exhaust gas at the impingement point were in the order of 425 to 1800 ft/sec and 450 to 1300°F with the nozzle height ranging from 3 to 6 feet. The results indicate that unprepared surfaces will not be usable for the range tested. Sod covered with landing mats could be used on a limited basis, and concrete probably could be used for an indefinite period. (Author)

Wichita U., Kansas.
SHROUDED PROPELLER INVESTIGATIONS: SHROUD AND CENTERBODY PRESSURE DISTRIBUTIONS OF A SHROUDED PROPELLER WITH A 10-BLADED ROTOR EXIT STATORS AND LONG CHORD SHROUD, by Vernon O. Hoehne. Rept. on Contract Nonr-201(01). Jan 60, 55p. 1 ref. Engineering rept. no. 213-10; AD-231 468.
Order from LC mi$3.60, ph$9.30 PB 152 898

The static pressure distribution on the surface of the shroud and centerbody of a shrouded propeller model was measured in the wind tunnel. The shrouded propeller model embodied 10 propeller blades and 15 exit stator vanes and was equipped with a centerbody or hub having a hub-tip ratio of 0.3. The model incorporated 3 interchangeable shroud inlets: 2 designed for static and low speed operation, and one for high speed flight. Only one of the static shroud inlets was tested during this investigation. Pressure distributions were obtained for a range of external advance ratios from approximately 0.20 through 1.50, at angles of attack from zero to 90° and with several propeller blade pitch angles. Results are presented as pressure coefficients plotted against model axial location in per cent of chord at various constant values of advance ratio. (Author) (See also PB 149 484)

Electrical and Electronic Engineering

Admiral Corp., Chicago, Ill.
EVALUATION AND DEVELOPMENT OF MIL-C-14157 CAPACITORS FOR NUCLEAR RADIATION ENVIRONMENT, by E. R. Pfaff. Scientific rept. no. 5 on Contract NObsr-77612. [1960] 43p. 5 refs.
Order from LC mi$3.30, ph$7.80 PB 153 096

All capacitor units impregnated with uninhibited FS-5 and silicone gel dielectric impregnant and the capacitors with FC-43 dielectric fluid constituting the gamma group failed in less than 63 hours. Irradiated units with Etherm "A" dielectric fluid and 4% Tertiary Butyl Anthraquinone exhibited a slight improvement in the seventy-five per cent failure point over the irradiated standard 1% inhibited units. The control group units with additional inhibitor had an appreciable improvement in the seventy-five per cent failure point over the 1% inhibited units. The seventy-five per cent failure point of the irradiated cross-linked polystyrene solid impregnant capacitors occurred more rapidly than the standard units. Post irradiation tests of Mylar indicate that the Mylar is being damaged by hydrolytic degradation rather than gamma damage. This type of damage can be improved by isocyanate treatment of Mylar. Dielectric properties of Monoisopropylbiphenyl dielectric fluid have been improved by filtration. (Author)

Aero Geo Astro, Corp., Alexandria, Va.
A BROAD-BAND OMNIDIRECTIONAL ANTENNA FEED FOR DUAL POLARIZATION, by D. M. Bowie and B. R. Gross. Scientific rept. no. 2 on Contract AF 19(604)5481. 26 Sep 60, 30p. 2 refs. AFCRL-TN-60-1105; AD-245 194.
Order from LC mi$2.70, ph$4.80 PB 152 728

A broad-band antenna feed suitable for low-silhouette aircraft installation offering omnidirectional coverage in azimuth separately for horizontal and vertical polarization has been developed and tested, using an X-band prototype structure. The near-field radiation characteristics of the structure make it suitable either as a radiator utilizing a small external structure or as a feed for radial surface-wave or reflective structures. The design, which was proposed earlier by Plummer and others, provides for concentric arrangement of two coaxial transmission lines supporting the modes usually used in separate feeds for the two polarizations. Energy from the inner coaxial line, supporting the TEM mode, and the outer line, designed to transmit the TE_{01} coaxial mode, are transformed by means of a toroidal splash plate and the ground plane into parallel and perpendicularly polarized waves, respectively. A mode-suppressor for use in the latter line has been developed, which effectively suppresses radial field components, thereby achieving separation of signals in the two transmission lines on the basis of polarization. Radiation patterns for the feed in conjunction with a circular ground plane of limited extent, with and without a grounded dielectric layer are included. (Author)

Air Force Cambridge Research [Labs.] Bedford, Mass.
OPTIMUM THRESHOLD FSK COMMUNICATION WITH DECISION REJECTION, by David Middleton. Apr 60, 61p. 4 refs. AFCRC TR-60-137.
Order from LC mi$3.90, ph$10.80 PB 152 985

Optimum incoherent threshold detection of general FSK signals in normal noise is examined, where the new feature of decision rejection, as well as decision acceptance, is used. Structure of the optimum threshold system is given, and the error and rejection probabilities associated with the Bayes risk are computed for general signals and arbitrary baud lengths. It is shown, in particular, that for the same error probabilities in either state it is possible to have a smaller input signal level with rejection than without it, the rejection probabilities being non zero, of course, with a consequent reduction in information rate. Besides a detailed examination of the binary rejection cases, the theory of the multiple alternative detection process with decision rejection is also outlined. (Author)

Air Force Cambridge Research Labs., Bedford, Mass.
THEORETICAL LIMITATIONS ON FREQUENCY AND TIME DIVERSITY FOR FADING BINARY TRANSMISSIONS, by J. N. Pierce. July 60, 24p. 4 refs. ERD TR-60-169; AD-245 723.
Order from LC mi$2.70, ph$4.80 PB 152 984

It is theoretically possible to minimize the element error rate in frequency-diversity or time-diversity systems by proper choice of number of diversity branches. The optimum number of branches is a function of both the total available SNR and the diversity-combining method. This theoretical optimization has been carried out for two representative combining methods. The results provide an upper bound on the diversity improvement achievable with frequency or time diversity. (Author)

Army Signal Research and Development Lab., Fort Monmouth, N. J.
OPTIMIZATION OF A STRIP LINE TRAVELING WAVE LOOP DIRECTIONAL FILTER AS A BAND REJECTION NETWORK, by Robert D. Standley. 1 July 60, 23p. 11 refs. USASRDL Technical rept. 2133; AD-242 485.
Order from LC mi$2.70, ph$4.80 PB 153 003

This report released for sale to the public 11 Jan 61.

An analysis of a strip line traveling wave loop directional filter is performed to optimize the device as a band rejection filter. A method for choosing the optimum physical parameters is developed. Several illustrative examples are given to show that a considerable difference exists between the optimum band pass and optimum band rejection designs. A construction which does not require a solid dielectric base material is suggested. (Author)

Bell Telephone Labs., Inc., Whippany, N. J.
AN ULTRA-PRECISE STANDARD OF FREQUENCY, by W. L. Smith. Interim rept. no. 12, 10 July-9 Dec 59, on Contract DA 36-039-sc-73078. 23 Dec 59, 37p. Rept. no. 27480-K; AD-233 680.
Order from LC mi$3.00, ph$6.30 PB 149 722

This report includes (1) a discussion of the results to date of a program to determine the effects of different mounting arrangements on the acceleration coefficient of frequency of 5-mc crystal units; (2) a discussion of the mechanical and electrical design of two development models for oscillators satellite application; and (3) a description of the mechanical design proposed for the final models of the satellite oscillator. Several crystal units have been made which meet the requirements for missile-borne applications, using a three-point 90° mounting with two points on the Z' axis. However, the factors controlling the acceleration coefficient are not sufficiently well known to assure reproducible results. Two preliminary development models of the satellite oscillator have been completed and tested for frequency stability during vibration, shock, and static acceleration. (Author) (See also PB 149 719)

Bell Telephone Labs., Inc., Whippany, N. J.
AN ULTRA-PRECISE STANDARD OF FREQUENCY, by W. L. Smith. Interim rept. no. 13, 10 Dec 59-9 Mar 60, on Contract DA 36-039-sc-73078. 23 Mar 60, 28p. Rept. no. 27480-L; AD-238 443.
Order from LC mi$2.70, ph$4.80 PB 152 658

This report includes (1) a description of the mechanical and electrical design of the final models of the satellite oscillator; (2) a summary of the performance of these oscillators during testing; and (3) the results of aging tests on crystal units operating at temperatures below 50°C. Two final models of the satellite oscillator operating at 4.996115 mc were completed, and tested for frequency stability during mechanical shock, vibration, and linear acceleration. Performance of both units was well within target requirements. Frequency drift rate due to a ±1°C change in ambient temperature was also satisfactory. A 4.996115-mc crystal unit, sealed in a small metal holder and operated at 41°C, has shown an initial aging rate of less than 1 pp 10^9/day. A 5-mc unit, sealed in a glass envelope and operating at 35°C, has shown a total aging of about 2 pp 10^9 during an eight-day run. (Author) (See also PB 144 300)

Birmingham U. (Gt. Brit.).
CHARACTER RECOGNITION, by D. A. Bell. Final rept. for 1 Oct 59-30 Sep 60 on Contract DA 91-591-EUC-1291. [1960] 25p. 6 refs; AD-245 769.
Order from LC mi$2.70, ph$4.80 PB 152 926

Contents:
Correlation Detection of Five-Unit Code Signals.
Correlation Recognition of the Printed Numerals 0 to 9.
Mosiac Reader.
(See also PB 144 238)

Bureau of Naval Weapons, Washington, D. C.
AC AND DC VOLTAGE 10 TO 1000 VOLTS. BuWeps-BuShips Calibration Program. 25 Sep 58, 29p. Secondary Standards Lab. Measurement System Operation Procedure BE-05.
Order from OTS $0.75 PB 171 212

This procedure describes the operation of a secondary standard calibration system which is used to calibrate dynamometer type Test Instruments by the reverse dc method. This procedure normally applies to the calibration of Test Instruments with accuracies between 0.25% and 0.5% of full scale. Test Instruments of lesser accuracy than 0.5% of full scale should be calibrated by a less accurate system than that described herein, if such is available.

Bureau of Naval Weapons, Washington, D. C.
AC-DC VOLTAGE INSTRUMENTS 10-1000V FULL SCALE. BuWeps-BuShips Calibration Program. 25 July 60, 20p. Secondary Standards Lab. Instrument Calibration Procedure AE-25.
Order from OTS $0.50 PB 171 209

This procedure describes the calibration of dynamometer voltmeters; it will verify correct performance of the Test Instrument within the required tolerances. Perform corrective action in accordance with the instruction manual and local laboratory practices.

Bureau of Naval Weapons, Washington, D. C.
AC VOLTAGE, 0.0001 TO 800 VOLTS 60 CPS. BuWeps-BuShips Calibration Program. 19 Sep 58, 30p. Secondary Standards Lab. Measurement System Operation Procedure BE-03.
Order from OTS $0.75 PB 171 213

This procedure describes the operation of a secondary standard calibration system which is used to calibrate ac voltage measuring instruments by the Thermal Transfer method. This procedure normally applies to the calibration of Test Instruments with accuracies between 0.25% and 0.75% of full scale. Test Instruments of lesser accuracy than 0.75% of full scale should be calibrated by a less accurate system than that described herein, if such is available.

Bureau of Naval Weapons, Washington, D. C.
CAPACITANCE, 0.1 TO 1050 μμF DIRECT SUBSTITUTION METHOD. BuWeps-BuShips Calibration Program. 7 Aug 58, 17p. Secondary Standards Lab. Measurement System Operation Procedure BC-01.
Order from OTS $0.50 PB 171 219

This procedure describes the operation of a secondary standard calibration system which is used to calibrate both fixed and decade-type capacitance units by the direct substitution method using the Schering Bridge, Parallel Mode. This procedure normally applies to the

measurement of capacitance units with accuracies between 0.4% and 1%. Capacitance units of lesser accuracy than 1% should be calibrated by a less accurate system than that described herein, if such is available. This method does not give a direct measurement of the dissipation factor of the capacitance unit under calibration. The dissipation factor as read by the Capacitance Bridge is the combined dissipation factors of the Precision Capacitor, Test Instrument, and connecting leads.

Bureau of Naval Weapons, Washington, D. C.
CAPACITANCE, 1 TO 1050 μμF SUBSTITUTION METHOD 1 MCPS. BuWeps-BuShips Calibration Program. 14 Aug 58, 11p. Secondary Standards Lab. Measurement System Operation Procedure BC-02.
Order from OTS $0.50 PB 171 220

This procedure describes the operation of a secondary standard calibration system which is used to calibrate both fixed and decade-type capacitance units by the substitution method using the Schering Bridge. This procedure normally applies to the measurement of capacitance units with accuracies between 0.4% and 1%. Capacitance units of lesser accuracy than 1% should be calibrated by a less accurate system than that described herein, if such is available. This method does not give a direct measurement of the dissipation factor of the capacitance unit under calibration. The dissipation factor as read by the Capacitance Bridge is the combined dissipation factors of the Precision Capacitor, Test Instrument, and connecting leads.

Bureau of Naval Weapons, Washington, D. C.
CAPACITANCE, 100 μμF TO 1 μF DIRECT METHOD. BuWeps-BuShips Calibration Program. 18 Aug 58, 16p. Secondary Standards Lab. Measurement System Operation Procedure BC-05.
Order from OTS $0.50 PB 171 221

This procedure describes the operation of a secondary standard calibration system which is used to calibrate both fixed and decade-type capacitance units by the direct method using the Schering Bridge. This procedure normally applies to the measurement of capacitance units with accuracies between 0.4% and 1%. Capacitance units of lesser accuracy than 1% should be calibrated by a less accurate system than that described herein, if such is available.

Bureau of Naval Weapons, Washington, D. C.
CAPACITANCE, 100 μμF TO 1100 μF DIRECT METHOD 60 CPS. BuWeps-BuShips Calibration Program. 19 Aug 58, 14p. Secondary Standards Lab. Measurement System Operation Procedure BC-04.
Order from OTS $0.50 PB 171 223

This procedure describes the operation of a secondary standard calibration system which is used to calibrate both fixed and decade-type capacitance units by the direct method using the Series Resistance Bridge Method. This procedure normally applies to the measurement of capacitance units with accuracies between 3% and 5%. Capacitance units of lesser accuracy than 5% should be calibrated by a less accurate system than that described herein, if such is available.

Bureau of Naval Weapons, Washington, D. C.
CAPACITANCE, 100 TO 1150 μμF DIRECT METHOD 1 MCPS. BuWeps-BuShips Calibration Program. 15 Aug 58, 10p. Secondary Standards Lab. Measurement System Operation Procedure BC-03.
Order from OTS $0.50 PB 171 222

This procedure describes the operation of a secondary standard calibration system which is used to calibrate both fixed and decade-type capacitance units by the direct method using the Schering Bridge. This procedure normally applies to the measurement of capacitance units with accuracies between 0.4% and 1%. Capacitance units of lesser accuracy than 1% should be calibrated by a less accurate system than that described herein, if such is available.

Bureau of Naval Weapons, Washington, D. C.
DC CURRENT INSTRUMENTS 1.0 TO 200 AMPERES FULL SCALE. BuWeps-BuShips Calibration Program. 26 Nov 58, 20p. Secondary Standards Lab. Instrument Calibration Procedure AI-02.
Order from OTS $0.50 PB 171 210

This procedure describes the calibration of direct current ammeters herein referred to as the Test Instrument. A sample "Calibration Report" form has been included at the conclusion of this procedure. The Weston Model 901 DC Ammeter has been selected as a representative Test Instrument in the preparation of the form. When calibrating other Test Instruments, the sample report should be used as a guide. This procedure normally applies to the calibration of instruments with full-scale ranges from 1.0 to 200 amperes, and with full-scale accuracies between 0.2% and 0.75%. Instruments of lesser accuracy than 0.75% full scale should be calibrated by a less accurate system than that utilized herein, if such is available.

Bureau of Naval Weapons, Washington, D. C.
DC RESISTANCE, 0.00001 TO 1.0 OHM. BuWeps-BuShips Calibration Program. 6 July 60, 11p. Secondary Standards Lab. Measurement System Operation Procedure BR-04.
Order from OTS $0.50 PB 171 205

This procedure describes the operation of a secondary standards laboratory calibration system which is used to calibrate direct current resistance instruments, using the Kelvin Bridge. The Kelvin Bridge system offers a means of measuring low valued four-terminal resistors, largely free of the error contributed by lead and contact resistance. This is achieved by putting the leads and contacts in series with high resistance in the ratio arms; using a sufficiently low resistance yoke in relation to the resistance value being measured; and where accuracy requires, arranging the Ratio Box lead resistance ratio to match the ratio being used. This procedure normally applies to the calibration of Test Instruments with accuracies between 0.05% and 1.0%. Test Instruments of lesser accuracy than 1.0% should be calibrated by a less accurate system than that described herein, if such is available.

Bureau of Naval Weapons, Washington, D. C.
DC RESISTANCE 0.1 OHM TO 100 MEGOHMS. BuWeps-BuShips Calibration Program. 2 Sep 58, 13p. Secondary Standards Lab. Measurement System Operation Procedure BR-03.
Order from OTS $0.50 PB 171 206

This procedure describes the operation of a secondary standard calibration system which is used to calibrate direct current resistance instruments, using the Wheatstone Bridge method. This procedure normally applies to the calibration of Test Instruments with accuracies between 0.5% and 1.0%. Test Instruments of lesser accuracy than 1.0% should be calibrated by a less accurate system than that described herein, if such is available.

Bureau of Naval Weapons, Washington, D. C.
DC RESISTANCE 10 OHMS TO 1,000,000 MEGOHMS. BuWeps-BuShips Calibration Program. 2 Sep 58, 10p. Secondary Standards Lab. Measurement System Operation Procedure BR-02.
Order from OTS $0.50 PB 171 207

This procedure describes the operation of a secondary standard calibration system which is used to calibrate decade and fixed type, two terminal, direct current resistance instruments, using an unguarded megohm bridge. This system does not allow for the separation in measurement of the shunt leakage resistance that becomes significant beyond approximately ten megohms. This procedure normally applies to the calibration of Test Instruments with a minimum ratio of 4:1 between the applicable system phase accuracy and the Test Instrument accuracy. Test Instruments of lesser accuracy should be calibrated by a less accurate system than that described herein, if such is available.

Bureau of Naval Weapons, Washington, D. C.
DC VOLTAGE 0 TO 1000 VOLTS. BuWeps-BuShips Calibration Program. 21 Feb 58, 11p. Secondary Standards Lab. Measurement System Operation Procedure no. BE-01.
Order from OTS $0.50 PB 171 215

This procedure describes the operation of a secondary standard calibration system which is used to calibrate direct current voltage measuring instruments, by the dc Potentiometric method. This procedure applies normally to the calibration of instruments with maximum ranges not exceeding 1000 volts, and with accuracies between 0.25% and 0.5% full scale. Instruments of lesser accuracy than 0.5% full scale should be calibrated by a less accurate system than that described herein, if such is available.

Bureau of Naval Weapons, Washington, D. C.
DC VOLTAGE 1.02 TO 1000 VOLTS. BuWeps-BuShips Calibration Program. 27 Feb 58, 7p. Secondary Standards Lab. Measurement System Operation Procedure BE-02.
Order from OTS $0.50 PB 171 214

This procedure describes the operation of a secondary standard calibration system which is used to calibrate direct current voltage measuring instruments, using a calibrated voltage source. This procedure applies normally to the calibration of instruments with maximum ranges not exceeding 1000 volts, or ranges with a minimum value of 1.02 volts, and with accuracies between 0.5% and 1.0% full scale. Instruments of lesser accuracies than 1.0% full scale should be calibrated by a less accurate system than that described herein, if such is available.

Bureau of Naval Weapons, Washington, D. C.
DC VOLTAGE INSTRUMENTS 1-1500 MV FULL SCALE. BuWeps-BuShips Calibration Program. 16 Oct 58, 16p. Secondary Standards Lab. Instrument Calibration Procedure AE-01.
Order from OTS $0.50 PB 171 218

This procedure describes the calibration of direct current millivoltmeters herein referred to as Test Instruments. A sample Calibration Report form has been included at the conclusion of this procedure. The Weston Model 622 DC Millivoltmeter has been selected as a representative Test Instrument in the preparation of this form. When calibrating other Test Instruments, the sample report should be used as a guide. This procedure applies normally to the calibration of instruments with full scale ranges from 1 to 1500 millivolts, and with full-scale accuracies between 0.2% and 0.75%. Instruments of lesser accuracy than 0.75% full scale should be calibrated by a less accurate system than that utilized herein, if such is available.

Bureau of Naval Weapons, Washington, D. C.
DC VOLTAGE INSTRUMENTS 15-1000 VOLTS FULL SCALE. BuWeps-BuShips Calibration Program. 3 Nov 58, 14p. Secondary Standards Lab. Instrument Calibration Procedure AE-03.
Order from OTS $0.50 PB 171 217

This procedure describes the calibration of direct current voltmeters herein referred to as Test Instruments. A sample "Calibration Report" form has been included at the conclusion of this procedure. The Westinghouse Model PX-4 DC Voltmeter has been selected as a representative Test Instrument in the preparation of this form. When calibrating other Test Instruments, the sample report should be used as a guide. This procedure applies normally to the calibration of instruments with full-scale ranges from 15 to 1000 volts, and with full-scale accuracies between 0.5% and 2.0%. Instruments of lesser accuracy than 2.0% full scale should be calibrated by a less accurate system than that utilized herein, if such is available.

Bureau of Naval Weapons, Washington, D. C.
DECADE RESISTORS 0.1 TO 100,000 OHMS PER STEP (USING L&N 4232-A1 BRIDGE). BuWeps-BuShips Calibration Program. 2 May 60, 17p. Secondary Standards Lab. Instrument Calibration Procedure AR-06.
Order from OTS $0.50 PB 171 211

This procedure describes the calibration of decade resistors. This procedure will verify correct performance of the Test Instrument within the required tolerances. Normally, each recorded value is compared to its tolerance and corrective action taken, if required,

before continuing the test. However, it is sometimes desirable to delay the verification and corrective action until several related values have been recorded. A sample Calibration Report form has been included at the conclusion of this procedure. The General Radio 1432A has been selected as a representative Test Instrument in the preparation of this form. When calibrating other Test Instruments, the sample report should be used as a guide. This procedure applies normally to the calibration of instruments with resistance decades of 0.1 to 100k ohms per step, and with accuracies between 0.05% and 0.5%. Instruments of lesser accuracy than 0.5% should be calibrated by a less accurate system than that utilized herein, if such is available. This procedure covers the calibration of Test Instruments by measuring the dc resistance at each step of the decade; it does not provide for the measurement of the Test Instrument residual resistance.

Bureau of Naval Weapons, Washington, D. C.
FREQUENCY RESPONSE 10 CPS TO 10 MCPS, 0.5 MV TO 5.2V AND AC VOLTAGE CALIBRATION DC TO 10 MCPS, 0.1 TO 5.2 VOLTS. BuWeps-BuShips Calibration Program. 18 Jan 60, 29p. Secondary Standards Lab. Measurement System Operation Procedure BF-06.
Order from OTS $1.00 PB 171 216

This procedure describes the operation of a Secondary Standards Laboratory calibration system which is used to measure the frequency response and/or ac voltage of indicating and generating instruments.

Bureau of Naval Weapons, Washington, D. C.
INDUCTANCE, 1.0μH TO 10 H DIRECT METHOD. BuWeps-BuShips Calibration Program. 28 Aug 58, 23p. Secondary Standards Lab. Measurement System Operation Procedure BL-01.
Order from OTS $0.50 PB 171 208

This procedure describes the operation of a secondary standard calibration system which is used to calibrate both fixed and decade-type inductance units, by the direct method using an Inductance Bridge. This procedure normally applies to the calibration of Test Instruments with accuracies between 1.0% and 2.0%. Test Instruments of lesser accuracy than 2.0% should be calibrated by a less accurate system than that described herein, if such is available. This system is not suitable for the calibration of inductors with magnetic cores, since no provision is made for the determination of the incremental inductance due to current in the winding.

Bureau of Naval Weapons, Washington, D. C.
STANDARDS INDUCTORS, 100μH TO 10H GENERAL RADIO 1482 SERIES (USING GR 1632A BRIDGE). BuWeps-BuShips Calibration Program. 19 May 60, 13p. Secondary Standards Lab. Cross-Check Procedure CL-02.
Order from OTS $0.50 PB 171 201

This procedure describes the cross-check of two like-valued General Radio Standard Inductors, 1482 series, by the direct substitution method; it also applies to similar standard inductors with accuracy and stability specifications equal or nearly equal to the General Radio 1482 series. Standard inductors of lesser accuracy may be calibrated rather than cross-checked.

Bureau of Naval Weapons, Washington, D. C.
STANDARD RESISTORS NBS TYPE 1 OHM TO 100,000 OHMS (USING L&N 4232-A1 BRIDGE). BuWeps-BuShips Calibration Program. 27 Apr 60, 12p. Secondary Standards Lab. Cross-Check Procedure CR-02.
Order from OTS $0.50 PB 171 200

This procedure describes the cross-check of two like-valued standard resistors; it also applies to similar standard resistors with accuracy specifications equal or nearly equal to those listed. Standard resistors of lesser accuracy may be calibrated rather than cross-checked.

Bureau of Naval Weapons, Washington, D. C.
VOLTAGE STANDING WAVE RATIO, X-BAND (8.20 TO 12.40 KMC) 1.01:1 TO 10:1. BuWeps-BuShips Calibration Program. 13 July 60, 13p. Secondary Standards Lab. Measurement System Operation Procedure HV-05.
Order from OTS $0.50 PB 171 204

This procedure describes the operation of a secondary standards laboratory calibration system which is used to measure the voltage standing wave ratio of X-band instruments of 1" x 1/2" waveguide size (outside dimensions).

Columbia U. School of Engineering, New York.
A CLASS OF OPTIMUM NON-LINEAR FILTERS FOR QUANTIZED INPUTS, by Frank Tung. Technical rept. T-2/N on Contract AF 19(604)4140. 1 July 60, 48p. 12 refs. CU-8-60-AF-4140-EE; ERD TN-60-769.
Order from LC mi$3.30, ph$7.80 PB 152 254

Optimum non-linear filters belonging to Zadeh's class $\mathcal{H}_1$ are considered. Attention is restricted to those systems whose present output is influenced only by a portion of the past input. The input signal consists of a message and noise both of which are stationary random processes. For this class of filters it is found that only the second order probability density functions of the message and the noise are necessary for obtaining the optimizing integral equation. It is assumed that the amplitude of the input time series is bounded and takes on discrete values at all times. This assumption is not too restrictive in practice since data supplied by computers and devices using digital read-out are quantized. By subjecting the joint probability density functions to a few mild restrictions, it is found that the optimizing integral equation reduces to a system of integral equations of the Wiener-Hopf type. By virtue of the assumptions made, the Fourier transforms of the kernels of these equations are rational functions. A method is developed for the solution of this set of simultaneous integral equations and three examples are given. (Author)

Cornell-Dubilier Electric Corp., Indianapolis, Ind.
RESEARCH AND DEVELOPMENT OF BATTERY CHARGER PP-1451 ( )/G, by G. B. Todd. Final rept. for 28 Mar 56-28 Jan 59 on Contract DA 36-039-sc-71226. [1959] 51p. AD-232 947.
Order from LC mi$3.60, ph$9.30 PB 149 703

This report covers research and development and production of prototype for a closely regulated, well filtered, power supply for operation of various communication gear, telephone switch boards, etc., and for the purpose of charging batteries. The power output is 28 VDC or 56 VDC at 1400 watts. Design was successfully completed and prototypes were constructed.

Curtiss-Wright Corp., Santa Barbara, Calif.
HYPERSONIC FREE FLIGHT RESEARCH. PART I: INSTRUMENTATION EVALUATION AND DATA ANALYSIS, by R. W. Bogle and R. J. Magnus. Rept. on Contract AF 33(616)5104. July 60, 45p. 9 refs. WADD Technical rept. 59-708, Part I.
Order from OTS $1.25 PB 171 194

Investigations of the reliability and accuracy levels of the data-gathering system of the two-stage HTV-1 Hypersonic Test Vehicle were conducted. Environmental tests of the airborne magnetic tape recorder under accelerations, vibrations, impacts and temperatures approximating the free-flight environment of the HTV-1 provided a basis for quantitative interpretation of the aerothermodynamic data and determination of the accuracy level for the HTV recorder system. Results indicate that the electrical and mechanical performance of the tape recorder and data measuring system is satisfactory. The accuracy level of directly measured quantities is approximately 2.5 percent. Similar results are obtained for indirectly obtained quantities that exhibit large changes in short time intervals. Indirectly obtained quantities that vary slowly over relatively long time intervals, for example heating rates may result in errors of the order of 10% and in the worst cases, 45%. (Author)

Diamond Ordnance Fuze Labs., Washington, D. C.
BIBLIOGRAPHY OF NBS REPORTS ON PERFORMANCE OF TELEMETRY TRANSDUCERS AND CALIBRATION METHODS, by Joseph Pearlstein. 12 Oct 60, 5p. 44 refs. Technical rept. TR-887.
Order from LC mi$1.80, ph$1.80 PB 153 496

This bibliography is a current list of reports that have been prepared by the Mechanical Instruments Section, Instrumentation Division of the National Bureau of Standards, under a program to determine the performance of transducers used for telemetry and to develop testing and calibration methods for these devices. (Author)

Diamond Ordnance Fuze Labs., Washington, D. C.
COMPARISON OF A DUAL AND A SINGLE THRESHOLD METHOD OF DETECTION FOR A SCANNING RADAR, by Joseph V. Cuneo. 14 Nov 50, 24p. Technical rept. TR-879.
Order from LC mi$2.70, ph$4.80 PB 152 655

Two detection methods were experimentally compared, using simulated returns of a scanning radar. The single threshold method which employed a filter closely approximating a matched filter was found superior to a dual threshold method which utilized the occurrence of a number of consecutive threshold crossings. The superiority of the single threshold method was not uniform but was found to be dependent upon the S/N ratio of the radar return. Under the experimental conditions described in this report, and for a given probability of detection per scan, the single threshold method exhibited an advantage of 2 to 3 db over a 6 to 15 db range of a signal-to-noise ratios. However, the advantage of the single threshold method was obtained at the cost of considerable complexity in the instrumentation of a detection system. (Author)

Diamond Ordnance Fuze Labs., Washington, D. C.
K-BAND RECIPROCAL FERRITE PHASE MODULATOR, by Frank Reggia. 7 Nov 60, 14p. 7 refs. TR-870.
Order from LC mi$2.40, ph$3.30 PB 152 581

A reciprocal ferrite phase modulator has been designed for use at 23 to 25 kMc that makes use of small magnetic fields for obtaining very large phase shifts. It consists essentially of a Ni-Zn ferrite rod centrally located inside a standard rectangular waveguide excited in the TE_{01} mode and a low-current solenoid for producing the longitudinal control field. With a proper choice of rod diameter and impedance matching elements, phase shifts greater than 600 deg/in. of effective length of rod and variations in transmitted power less than 0.2 db have been obtained with external control fields less than 50 oersteds. The zero-field insertion loss is approximately 0.1 db/in. and the total weight of the 3-in. long modulator is 5 oz. These characteristics, along with its simple geometrical configuration, low operating power requirement and small size, make this electrically controlled reciprocal phase modulator especially suitable for rapid-scanning microwave antennas. (Author)

Diamond Ordnance Fuze Labs., Washington, D. C.
MINIATURIZED HIGH-PRECISION CRYSTAL OSCILLATOR, by K. H. Sann. 10 Nov 60, 27p. 3 refs. TR-878.
Order from LC mi$2.70, ph$4.80 PB 152 922

Missile guidance and control systems using frequency standards offer a variety of possible advantages. Quartz crystal oscillators used as frequency standards are stable, and are sufficiently small and light in weight to permit their consideration in missile systems. An analysis was made of the effects of components on frequency stability of a highly miniaturized, stable crystal oscillator. A laboratory model was built that weighs 1 lb, occupies 20 $in.^3$, and has a short-term stability under laboratory conditions of better than 10^{-9}. The performance characteristics promise, with further work, to lead to a miniaturized frequency standard of 10^{-9} under the assumed dynamic conditions. (Author)

East Coast Aeronautics, Inc., Pelham Manor, N. Y.
DEVELOPMENT OF A MODULAR SHELTER FOR ELECTRONIC SYSTEMS, by Arthur Kenger. Final rept. on Contract AR 30(635)4495. [1957] 40p. Technical rept. 192.04; RADC TR-57-85; AD-114 467.
Order from LC mi$3.00, ph$6.30 PB 153 273

A program for the design, fabrication and testing of a modular shelter for tactical electronic systems was undertaken at East Coast Aeronautics, Inc. The aim of the program was to investigate and establish design criteria for shelters incorporating techniques and materials applicable to shelter requirements. In addition to the above, the results of the investigation were to be used to design, manufacture, and test a modular shelter composed of the feature techniques and materials investigated. Work on this program was not completed. In view of this, the following report is presented to point out the deficiencies in the design in order to expedite future shelter developments. In addition to the deficiencies, a preliminary erection procedure is presented.

Electrical Engineering Research Lab., U. of Illinois, Urbana.
DRIVING-POINT FUNCTION SYNTHESIS BY TRANSFORMATION OF THE BRUNE NETWORK, by Vempati Gopala Krishna Murti. Interim technical rept. no. 16 on Contract DA 11-022-ORD-1983. 15 Jan 60, 84p. 25 refs. OOR rept. 2207.5-E; AD-232 931.
Order from LC mi$4.80, ph$13.80 PB 149 636

A new method of synthesizing driving-point immittance functions with passive linear elements and without transformers is presented. The method is based on the derivation of transformerless equivalent circuits for a single Brune cycle containing a perfectly coupled transformer. The equivalent circuits take the form of a symmetrical bridge network containing 2 identical impedance functions to be synthesized in the next stage. A comprehensive list of these networks relating their element values with those of the Brune network is given The topology and the number of elements in these bridge circuits depend on the turns ratio of the Brune transformer. From the point of reduction of the number of elements, a transformer of turns ratio 2 or 1/2 is favorable. A saving of 2 reactive elements per stage, as compared with the modified Bott-Duffin procedure, is possible. For other cases, the networks contain, for the large part, fewer elements than the corresponding Bott-Duffin bridge networks. In the regular Brune synthesis procedure, the minimum values of the real part of a given impedance function along the imaginary axis is removed as a series resistance. If, however, a resistance with a smaller value is removed in series and the remainder function developed on the admittance basis, a new Brune-type network is obtained. The parameters of this new network, including the transformer ratio, vary depending on the value of the series resistance in the first step. A method using this property is given for obtaining desired conditions in the Brune-type network. Special synthesis procedures for the practically biquadratic and bicubic functions are presented. (Author)

Electrical Engineering Research Lab., U. of Illinois, Urbana.
REALIZATION OF LOOP-RESISTANCE MATRICES, by Hing-Cheong So. Interim technical rept. no. 17 on Contract DA 11-022-ORD-1983. 15 Jan 60, 80p. 25 refs. OOR rept. 2207.6-E; AD-232 937.
Order from LC mi$4.50, ph$12.30 PB 149 637

A pure resistance network G is said to be a coherent realization of a symmetric, real matrix $M = [a_{ij}]$ if (1) M is the loop-resistance matrix of G for some set of loops [l] in G, and (2) there exist no 2 loops l_i and l_j in [l] such that l_i and l_j agree in orientations in one resistor R_a of G but oppose in orientations in another resistor R_b of G. Incoherent realizations are resistance networks which satisfy condition (1) but not condition (2). Coherent realizations are mainly considered, although incoherent realizations for third-order real matrices are discussed.

Electrical Engineering Research Lab., U. of Illinois, Urbana.
SYNTHESIS OF RC LADDER NETWORKS WITH SPECIFIED DRIVING-POINT AND TRANSFER FUNCTIONS, by James R. Young. Technical note no. 16 on Contract AF 49(638)63. 9 Sep 60, 76p. 31 refs. AFOSR-TN-60-1090; AD-244 369.
Order from LC mi$4.50, ph$12.30 PB 152 489

Necessary and sufficient conditions are stated for the realizability of the short-circuit admittance functions and the open-circuit impedance functions of high-pass and low-pass simple RC ladders. Synthesis of these simple RC ladders is accomplished through the use of formulas which simultaneously reduce both driving-point functions and the transfer function. It is shown that double zeros of Δ and Δ_{1122} occur when the open-circuit impedance functions or the short-circuit admittance functions, respectively, have noncompact poles. Finally, the Fialkow-Gerst coefficient conditions and the residue condition are shown to be sufficient for the realization of the short-circuit admittance functions or the open-circuit impedance functions of a low-pass or high-pass modified simple RC ladder. Shunt resistors or capacitors are added to the conventional low-pass or high-pass simple ladder to form a modified ladder. (Author)

Electrical Engineering Research Lab., U. of Illinois, Urbana.
TRANSFER FUNCTION SYNTHESIS BASED ON CASCADED RC AND RL NETWORKS, by Donald Albert Calahan. Technical note no. 15 on Contract AF 49(638)63. 1 Sep 60, 128p. 23 refs. AFOSR TN-60-1024; AD-244 368.
Order from LC mi$6.30, ph$19.80 PB 152 486

A method of partitioning transfer functions into RC and RL subnetwork functions is developed. It is shown that the poles of any transfer function realizable by cascaded RC and RL subnetworks are restricted by the condition

$$\sum \arg s_i \leq \frac{\pi}{2}$$

where the $-s_i$ are the upper half plane complex poles. Sufficient conditions are derived for the realization of any transfer function in the RC-RL form. A procedure is also developed for maximization of the gain constant of certain classes of transfer functions when realized by this model. (Author)

Electron Tube Research Lab., U. of Minnesota, Minneapolis.
STUDIES ON BASE NICKELS FOR OXIDE-COATED CATHODES, by W. G. Shepherd and D. E. Anderson. Scientific rept. no. 8, 15 Jan-15 Apr 60, on Contract AF 19(604)3890. [1960] 97p. 17 refs. ERD-TN-60-796.
Order from LC mi$5.40, ph$15.30 PB 152 735

A carbon-dispensing cathode base which throttles the rate of carbon flow to a more useful value is described. Cathodes, based on 0.2% and 0.08% Al-Ni alloys, have now been operated at 1093°K in excess of 10,000 hours. Stable emission levels of over 11 amps/cm^2 continue to be observed. Preliminary results are presented for the re-evolution of free Sr from Ti, using Sr^{89} as a tracer.

Electronics Research Lab., U. of California, Berkeley.
APPLICATION OF CORRELATION TECHNIQUES TO ANTENNA SYSTEMS, by I. W. Linder. Rept. on Contract N7onr-29529. 11 Jan 60, 25p. 3 refs. Rept. no. 100; IER series no. 60, issue no. 267; AD-235 198.
Order from LC mi$2.70, ph$4.80 PB 152 861

The development of the optimum antenna and the examples chosen to illustrate the theory involved have been intended as initial considerations in the general problem of detecting a noiselike signal buried in a general noisy medium. This development has utilized only in a general manner the extensive mathematical methods which can be used to handle noise problems. In this case a consideration of a spatial distribution of the noise was combined with the correlation function of random noise theory to arrive at an expression for "best" antenna array. (Author)

Electronics Research Lab., U. of California, Berkeley.
BOUNDS ON NATURAL FREQUENCIES OF LINEAR ACTIVE NETWORKS, by C. A. Desoer and E. S. Kuh. Rept. on Contract Nonr-222(74). 21 Mar 60, 30p. 5 refs. Rept. no. 103; IER series no. 60, issue no. 271; AD-236 376.
Order from LC mi$2.70, ph$4.80 PB 147 314

Recent developments of new active devices have stimulated circuit theorists to develop understanding of the potentialities and limitations of linear active networks. Research was concerned with the natural frequencies (i.e., the roots of the characteristic equation) of the network obtained by connecting the active device to an arbitrary passive network. (Author)

Electronics Research Lab., U. of California, Berkeley.
QUARTERLY PROGRESS REPORT, 1 OCTOBER-31 DECEMBER 1959. Rept. on Contracts N7onr-29529 and Nonr-222(53, 54, 57). 31 Jan 60, 28p. 4 refs. Series no. 60, issue no. 27; AD-235 450.
Order from LC mi$2.70, ph$4.80 PB 152 859

Contents:
Back-scattering from cones
Scattering from multiple targets
Scattering fields from anisotropic media
Microwave parametric amplifiers
Ferrite field-displacement device for slot coupling control
Network theory
Electronics circuits research
Antenna arrays from a data-processing viewpoint
Information theory
Solar emission and absorption
Research in high temperature semiconductor devices
Magnetic amplifiers (See also PB 145 072)

Electronics Research Lab., U. of California, Berkeley.
STABILITY OF RANDOM LINEAR SYSTEMS WITH MARKOV PARAMETERS (PART I), by B. H. Bharucha. Scientific rept. no. 2 on Contract AF 19(604)5466. 29 June 60, 35p. 10 refs. Series no. 60, issue no. 289; ERD-TN-60-776; AD-245 221.
Order from LC mi$3.00, ph$6.30 PB 152 741

The i-th moment stability of the random linear differential system with piecewise constant parameters: $\dot{x} = A_k x$, $t_{k-1} \leq t < t_k$, $k = 1, 2, \ldots$ is investigated when the parameter process is (a) an independent process, (b) a finite Markov chain. It is shown that almost sure asymptotic stability is a consequence of second moment asymptotic stability, whereas the converse statement is false. (Author)

Electronics Research Lab., U. of California, Berkeley.
STUDY OF CROSSED-FIELD AMPLIFIERS, by J. R. Whinnery, C. K. Birdsall and others. Final rept. for 1 Jan 58-31 Jan 60 on Contract DA 36-039-sc-74981. [1960] 53p. 11 refs. AD-240 766.
Order from LC mi$3.60, ph$9.30 PB 152 994

The completed fabrication of the second model of the crossed-field velocity analyzer is discussed. Preliminary measurements made to determine the plate characteristics for various heater voltages and the position of the sampling slit relative to the center of the beam as a function of the position of the movable cathode are reviewed. A program to determine the dependence of the noise figure on the parameters of a crossed-field amplifier with laminar-flow beam was initiated to follow up the promising preliminary results recently obtained here. An analysis of the crossed-field potential minimum is presented. The general form of the solution is derived. The coefficients in the general equations are defined after making certain simplifying assumptions. A numerical example is examined to

study the possibility of an instability being caused by the magnetic field. In large-signal work the beam width was determined to be only one-half of the previously assumed value. The large-signal theory of Sedin is shown to be verified for the case of low gain backward-wave amplification. Efficiencies as high as 62.5% are reported. The effect of input signal level on the phase shift through the amplifier is presented. (Author) (See also PB 149 410)

Electronics Research Lab., U. of California, Berkeley
SWITCHING AND MEMORY CRITERIA IN TRANSISTOR FLIP-FLOPS, by D. K. Lynn and D. O. Pederson. Rept. on Contract Nonr-222(74). 2 Mar 60, 23p. 8 refs. Rept. no. 101; IER series no. 60, issue no. 269; AD-236 377.
Order from LC mi$2.70, ph$4.80 PB 147 313

It is well known that the magnitude and length of the minimum input trigger pulse is closely related to the switching and memory aspects of the flip-flop. A study of the relationships is made in this report. Not all energy or charge storage elements or mechanisms can serve as the flip-flop memory. A memory criterion in terms of a simple physical argument has been established to determine which storage elements provide the necessary memory function. Switching criteria and the minimum amount of memory are determined from an analysis of the initial conditions of the regenerative switching action using piece-wise linear analysis techniques. From this information, estimates of maximum repetition frequency are made. Capacitively and inductively coupled flip-flops are used as illustrations, and experimental results with the circuits are presented. (Author)

Electronics Research Lab., U. of California, Berkeley.
SYNTHESIS OF N-PORT RC NETWORKS, by J. E. Olivares, Jr. Rept. on Contract N7onr-29529. 7 Jan 60, 153p. 24 refs. Rept. no. 99; IER series no. 60, issue no. 265; AD-233 147.
Order from LC mi$7.50, ph$24.30 PB 152 860

This report presents an attempt at determining the necessary and sufficient conditions that a matrix of rational algebraic functions is the immitance matrix of a grounded RC network. These networks are analyzed to determine necessary conditions and powerful methods for synthesizing them are developed. The results are then applied to synthesizing N-port RC networks. Previous work by other investigators is reviewed. The problem is then formulated mathematically in terms of the nodal admittance of a grounded RC network for which necessary and sufficient conditions are well known. Necessary conditions on terminal immittance matrices are derived from the properties of the nodal admittance matrix. Three related methods for synthesizing such networks are developed and numerous illustrative examples are shown. These three methods are a powerful means for synthesizing grounded RC networks of arbitrary structure with a minimum number of internal nodes. The results are applied to the synthesis of balanced N-port RC networks in which the restriction of a common ground is removed. (Author)

Elk Electronic Labs., Inc., New York.
DEVELOPMENT OF RADIO INTERFERENCE MEASURING SET AN/PRM-14( ) by Jacob Rosenbaum. Final rept. for Aug 54-Oct 58 on Contract DA 36-039-sc-63113. [1958] 108p. 4 refs. AD-211 487.
Order from LC mi$5.70, ph$16.80 PB 152 992

This report discusses the problems encountered and the solutions achieved in the development of an ultra-compact, lightweight and portable RF interference measuring set. Since ease of maintenance will determine the operational life of equipments, unit sub-assemblies were employed permitting plug-in replacement of parts and/or units reaching the end of their useful life. Since some of the data found in the Instruction Book is helpful in achieving a better overall understanding of this equipment, the complete Instruction Book for the AN/PRM-14( ) is included. (Author)

Fluid Dynamics Research Lab., Mass. Inst. of Tech. [Cambridge].
A SMALL PIEZOELECTRIC MICROPHONE, by Erik Mollö-Christensen. Rept. on NASA Contract NsG31-60. July 60, 10p. Fluid Dynamics Research Group rept. no. 60-3. AD-244 588.
Order from LC mi$1.80, ph$1.80 PB 152 603

This microphone was designed and constructed to fill the need for a small microphone with a frequency response in excess of 75 kilocycles per second. The difficult problem in the design of small piezoelectric microphones is the design of the terminal arrangement. This problem was solved by designing the microphone as a slight modification of a commercially available coaxial jack. (Author)

General Electric Co., Schenectady, N. Y.
INVESTIGATION OF VARIOUS ACTIVATOR-REFRACTORY SUBSTRATE COMBINATIONS, by J. H. Affleck. Scientific rept. no. 9 on Contract AF 19(604)4093. 6 Sep 60, 10p. 4 refs. AFCRL-TN-60-976; AD-244 484.
Order from LC mi$1.80, ph$1.80 PB 152 610

The thermionic constants and evaporation rates of several refractory substrate-activator combinations are reported and the results discussed. There is evidence to show that tungsten carbide and tantalum have desirable properties as the matrix element in a dispenser cathode. (Author) (See also PB 148 926)

General Electric Co., Schenectady, N. Y.
TRANSMITTING BEAM TETRODE, TYPE Z-5192, by J. L. Wilson. Final rept. for 1 Jan-31 Aug 59 on Contract DA 36-039-sc-78275. 27 Nov 59, 104p.; AD-231 626.
Order from LC mi$5.70, ph$16.80 PB 149 694

Assembly and processing of the Z-5192 tetrode is discussed. Results of the various tests are stated with the proposed limits for each test. Probability curves and histograms are presented which show the spread and distribution of each characteristic test. A proposed MIL-E-1 specification is included. (Author)

General Electric Co., Syracuse, N. Y.
FEASIBILITY STUDY OF THE USE OF PHASE SHIFT KEYING OVER AN IONOSPHERIC SCATTER TRANSMISSION CIRCUIT, by R. W. Swanson. Final rept. on Contract AF 19(604)4077. Mar 60, 225p. 23 refs. AFCRL TR-60-131.
Order from LC mi$9.90, ph$34.80 PB 152 958

A study, including implementation and field testing, was conducted to determine the feasibility of a phase shift keying (PSK) system and diversity reception for the transmission of binary information over an ionospheric scatter transmission circuit. The PSK equipment designed and built for this study operated at a frequency of 49.6 MC with dual equal-gain frequency diversity, and it could transmit data at a rate of 11.1 or 55.5 nine-bit messages per second (nominal 100 or 500 bits per second). Two methods of obtaining both bit and character timing information were implemented and tested. Field testing of the PSK equipment was carried out over the National Bureau of Standards Ionspheric Scatter Link between Havana, Illinois, and Boulder, Colorado. The field results obtained demonstrate the feasibility of using phase shift keying as a modulation technique for the transmission of binary information over an ionospheric scatter path under normal scattering conditions. The results of this test program and a discussion of them with the conclusions and recommendations that can be made are included in this report. (Author)

General Electric Co., Syracuse, N. Y.
FERRITE MATERIALS FOR MICROWAVE FREQUENCIES, by J. M. Blank, L. T. Piekarski and others. Final rept. 15 Sep 57-30 Dec 59, on Contract DA 36-039-sc-74904. [1960] 172p. 10 refs.
Order from LC mi$8.10, ph$27.30 PB 152 660

This report released for sale to the public 29 Dec 60.

The study on low-power microwave materials was directed toward learning to control the important parameters for achieving good microwave materials based on magnesium ferrite aluminate compositions. Although parameters concerned with batch preparation and firing schedule were controlled, good reproducibility of the desired properties was not achieved. Fine grain magnesium aluminum ferrite samples having an average grain size of less than 0.1 μ were successfully prepared by hot pressing techniques. The pressure-composition-temperature relationships at high temperature for the wustite, magnetite, and hematite phases of the iron oxide system were successfully explained by consideration of the entropy of mixing of lattice defects. The heat of mixing of the defects with the lattice was assumed to be zero; this was verified experimentally. Another helpful assumption was that the charge distribution in a given phase is independent of the composition of that phase. The temperature coefficient of permeability of a standard, fired sample containing 34.0 mol-% Fe_2O_3, 3.0 Mn_2O_3, 50.0 MgO and 13.0 Al_2O_3 was about 40 times greater than that for a hot pressed sample between 24° and 110°C. Strain gage equipment which was developed for measuring magnetostriction of ferrites was capable of measuring differences between samples at values of 1×10^{-8} to 2×10^{-8} inch/inch. This was adequate to show that one magnesium ferrite aluminate sample, which had a narrow resonance absorption line width for microwaves at low power levels, had small variations in magnetostriction which appeared to be correlated with small variations in line width for a number of samples.

Granger Associates, Palo Alto, Calif.
ANTENNA AS-1019(XE-1)/TRD, by R. E. Hunter. Quarterly progress rept. no. 3, 1 Feb-1 May 60, on Contract DA 36-039-sc-84533. [1960] 14p. AD-240 285.
Order from LC mi$2.40, ph$3.30 PB 152 671

The effort expended during this period was directed toward the production of Unit #1 and the preparation of that unit for testing. The antenna, its mast, and erection equipment were fabricated and assembled. A delay was experienced due to failure of the vendor to deliver the coaxial switch as scheduled, necessitating a slip in delivery data of the first unit. Upon receipt of this item, fabrication was completed and preliminary tests were conducted. (Author)

[Hermes Electronics Co.] Cambridge, Mass.
OVERTONE MODE FILTER CRYSTALS, by F. Earle Clark. Quarterly progress rept. no. 1, 1 Nov 58-28 Feb 59, on Contract DA 36-039-sc-78242. 28 Feb 59, 24p. 2 refs.
Order from LC mi$2.70, ph$4.80 PB 149 708

Spurious modes in the vicinity of the third thickness shear over-tone of AT-cut crystals have been found to be more closely spaced and to have greater amplitude than corresponding modes associated with the fundamental resonance. Temperature tests have been performed on resonances in 40 Mc third overtone crystals Data are included on 40 Mc third overtone crystals of four different diameters ranging from .250" to.500"

Hermes Electronics Co., Cambridge, Mass.
OVERTONE MODE FILTER CRYSTALS, by F. Earle Clark. Quarterly progress rept. no. 2, 1 Feb-30 Apr 59, on Contract DA 36-039-sc-78242. 30 Apr 59, 41p. 1 ref. AD-226 571.
Order from LC mi$3.30, ph$7.80 PB 149 709

New electrode patterns have been designed which minimize the amplitude of these modes. Data are included on 40 Mc third overtone crystals with three different electrode designs. Comparisons of mode configurations are also made at six different electrode orientations. (Author) (See also PB 149 708)

Hermes Electronics Co., Cambridge, Mass.
OVERTONE MODE FILTER CRYSTALS, by F. Earle Clark. Quarterly progress rept. no. 3, 1 May-31 July 59, on Contract DA 36-039-sc-78242. 31 July 59, 35p. 1 ref. AD-228 396
Order from LC mi$3.00, ph$6.30 PB 149 710

Data are included on 40 Mc third overtone crystals with eight different electrode designs. Comparisons of electrical parameters are also made. (Author) (See also PB 149 709)

Hughes Research Labs., Malibu, Calif.
EQUIVALENCE BETWEEN CONTINUOUS AND DISCRETE ARRAYS, by A. Ksienski. Scientific rept. no. 3508/7 on Contract AF 19(604)3508. 15 Apr 60, 23p. 5 refs. AFCRL-TN-60-1104.
Order from LC mi$2.70, ph$4.80 PB 152 841

The radiation patterns produced by continuous excitation distributions and discrete arrays are compared, and the conditions are derived under which one type of source may be substituted for the other with negligible errors. It is shown that the aperture lengths in both cases should be the same but the element spacing is dependent on the type of pattern desired. Examples are computed to demonstrate these relations for both directive patterns and shaped beams. (Author)

International Business Machines Corp., Kingston, N. Y.
THIN-FILM CIRCUIT FUNCTIONS, by W. N. Carroll, R. G. Counihan and others. Quarterly progress rept. no. 3, 1 Feb-30 Apr 60, on Contract DA 36-039-sc-84547. [1960] 120p. 18 refs. AD-240 819.
Order from LC mi$6.00, ph$18.30 PB 152 672

The selection of the astable multivibrator as the sixth circuit to be fabricated, factors affecting layout of thin-film circuits, machined masks, inductor fabrications, and the results of several preliminary circuit fabrications are described. Factual data is presented on thermo-compression bonds. Initial results of thermal studies include a plot of calculated steady-state isothermal lines in the substrate on one circuit. Fabrication techniques and initial environmental results are discussed. Results are given of further studies on the epitaxial deposition of silicon by the silicon-iodine disproportionating reaction in a closed tube. Included in these studies were experiments with an inverted reaction tube which showed that convection currents make the major contribution to deposition. Also described are steps taken to reduce substrate etching during normal deposition. The feasibility of co-depositing desired impurities with silicon was investigated and experimental results are given on 2 methods of introducing impurities. A description is given of several experimental methods for the fabrication of multiple-layer junctions The measured characteristics of fabricated diodes are presented. The six final circuits are described with detail circuit and layout information. Equipment utilized for fabricating the experimental models is described and the results of the first fabrication runs tabulated. Initial results are presented from the investigation into dielectric materials. (Author) (See also PB 150 808)

Ionosphere Research Lab., Pennsylvania State U., University Park.
EXPERIMENTAL AND THEORETICAL STUDIES OF IONOSPHERE ECHO POLARIZATION OVER THE SWEPT FREQUENCY RANGE 50-1000 KC/S, by H. N. Carlson. Scientific rept. no. 139 on Ionospheric Research, Contract AF 19(604)3875. 1 Oct 60, 44p. 8 refs. AFCRC-TN-60-683. AD-245 388
Order from LC mi$3.30, ph$7.80 PB 152 823

When electron density gradients are low enough, the echo from the $N = N_y$ level is found to change from left-handed to right-handed when the wave frequency is increased, as predicted theoretically. The $N = N_c$ echo appears near the middle of the frequency range and it is left-handed as expected. These echoes often overlap and interfere. When the overlap is slight, regular interference fringes appear as radio frequency is increased permitting a determination of the virtual height separation that agrees with, and is much more accurate than, the virtual height difference as measured by the time elapsed between reception of the echoes. With extreme gradients, the E-layer echo polarization is found to change from left-handed to right-handed and back to left-handed just once with no measureable increase in group height. It is shown that a simple ionosphere model--a step function--is adequate for a qualitative explanation of these changes in sense of rotation. It was found that the polarization of E-layer echoes frequently varies unsystematically. Antenna site effects can be ruled out as a cause of this and an explanation is offered that requires echoes that are double because of either high gradients or horizontal inhomogeneities. (Author)

Ionosphere Research Lab., Pennsylvania State U., University Park.
RAY THEORY ANALYSIS OF LOW FREQUENCY IONOGRAMS, by Arthur Brunnschweiler. Scientific rept. no. 140 on Ionospheric Research, Contract AF 19(604)3875. 1 Nov 60, 40p. 10 refs. AFCRC-TN-60-684. AD-245 389
Order from LC mi$3.00, ph$6.30 PB 152 824

The formation of low frequency ionograms is discussed in some detail and it is shown that ray theory (assuming zero collision frequency) is sufficient to explain the high echoes sometimes observed. The appearance of interference fringes between overlapping echoes is also described and an explanation given. A promising but not yet fully tested method for the reduction of low frequency ionograms is presented, including a discussion of the "valley" ambiguity. (Author)

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
IONIC CONDUCTIVITY OF SILVER IODIDE PELLETS FOR SOLID-ELECTROLYTE BATTERIES, by J. N. Mrgudich. Rept. on Contract Nonr-1841(10). June 59, 23p. 17 refs. Technical rept. 138; AD-219 686.
Order from LC mi$2.70, ph$4.80 PB 149 726

Silver amalgram electrodes were found to provide polarization-free contacts for the measurement of the ionic conductivity of compressed AgI powder pellets. Correlation of the conductivity data with X-ray diffraction studies established the presence of a deformed hexagonal phase as an important factor in determining pellet conductivity. Deformation can be induced by compression. Preliminary evidence is presented that hexagonal deformation can be induced by proper control of preparation or by suitable thermal or mechanical pretreatment of the AgI powder. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN ADDITIONAL CONSIDERATION IN THE DESIGN OF TRAVELING WAVE RESONATORS, by S. J. Miller. Rept. on Contract AF 19(604)7400. 26 Oct 60, 6p. 2 refs. 46G-0007; AD-246 186.
Order from LC mi$1.80, ph$1.80 PB 153 095

In an unpublished note, Griemsmann examines the build-up time of a traveling wave resonator. It is the purpose of this communication to develop the expressions for build-up tin e following the work of Griemsmann and to apply these results to some known or planned situation.

Lincoln Lab., Mass. Inst. of Tech., Lexington.
CURRENT OPERATED DIODE LOGIC GATE, by H. Reinecke, Jr. Rept. on Contract AF 19(604)5200. 21 July 60, 43p. 9 refs. Technical rept. no. 226.
Order from LC mi$3.30, ph$7.80 PB 152 750

The realization of switching functions using current-operated diode logic gates, which employ the direction of current as the binary variable, is presented. Two realization methods are discussed. The dual method consists of a set of rules which are analogous to the procedures employed for the realization of voltage-operated circuits. The lattice method is based on the transmission characteristics of a lattice network of four series-connected diodes. Either method is capable of realizing any arbitrary transmission function, although the number of diodes required may be different. Hybrid networks, which combine the advantages of both methods, are described to illustrate the versatility of current-operated techniques. Practical design procedures are included to guide the designer in the application of the realization rules A static multiplier, capable of simultaneously multiplying two 4-bit binary numbers, was designed and built to demonstrate the practicability of current-operated diode logic gates. Approximately 270 diodes were required to construct the twenty gates used in the static multiplier. Dynamic tests of the assembled system indicated a reliable capability of 333,000 multiplications per second. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
CURVED-EARTH COMPUTATIONS FOR AIRBORNE EARLY WARNING AND CONTROL, by N. I. Durlach, A. M. Carpenter, and M. A. Herlin. Rept. on Contract AF 19(122)458. 13 Jan 59, 164p. 13 refs. Technical rept. no. 194; AD-210 006.
Order from LC mi$7.80, ph$25.80 PB 149 741

In analyzing the performance of airborne radars, one is frequently faced with a problem in which the earth's curvature is a significant fact that cannot be ignored without introducing serious errors. This is particularly true when, as in the case of an airborne search radar, an appreciable amount of energy is incident on the earth's surface. This report is a collection of all the formulas that the authors have found useful in making curved-earth computations, and of all the graphs that have resulted from these computations. Both exact and approximate formulas are dealt with in the report and different formulas for the same functions are compared graphically to illustrate their relative merits. The choice of functions considered has been determined by two distinct problems: (a) plotting coverage diagrams and (b) locating the position of an enemy aircraft by using the earth's surface as a reflector.

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DESIGN AND ANALYSIS OF CIRCUITRY FOR A MATCHED FILTER SYSTEM, by William A. Petersen. Rept. on Contract AF 19(604)5200. 25 Aug 60, 31p. 5 refs. 25G-0001; AD-244 771.
Order from LC mi$3.00, ph$6.30 PB 152 629

This report is concerned with the circuit requirements of a Matched Filter System. The filters are 600 microsecond, 100-tap, acoustical delay lines. Herein presented is a general description of the system, its requirements, and the design considerations and detailed analysis of the transistorized circuits devised to meet these requirements. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
EFFECT OF HIGHER SPATIAL MODES ON PREDICTED MULTICAVITY KLYSTRON PERFORMANCE, by R. L. Pease. Rept. on Contract AF 19(604)5960. 25 July 60, 13p. 7 refs. Technical rept. no. 227.
Order from LC mi$2.40, ph$3.30 PB 152 948

Bers' single-mode theory of multicavity klystrons has been formally extended to include higher spatial modes; in addition, simple approximate expressions have been developed to show the effects of higher modes on predicted values of electronic conductance and over-all gain. Comparisons have been made between formal and approximate theoretical expressions for electronic conductance, and between these expressions and experimental values. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
EFFECTS OF FEED DISPLACEMENT ON PATTERNS OF PARABOLIC-CYLINDER REFLECTORS, by R. L. Pease and J. Pease. Rept. on Contract AF 19(604)5200. 2 June 60, 31p. 5 refs. Technical rept. no. 224; AD-245 618.
Order from LC mi$3.00, ph$6.30 PB 152 949

A calculation is made of the central-section pattern of a parabolic-cylinder reflector fed by a line source displaced from, but parallel with, the focal line. Approximate but specific results are obtained in the regions close to the principal maximum and far out from the principal maximum. Beam deviation factors are calculated for these two regions and are found to differ from each other. The effect of changing the feed pattern on the values of beam deviation factors is also found. Rough estimates are made of the accuracy of the present calculations and of the loss of gain due to feed displacement. (Author)

Lincoln Lab., Mass. Inst. of Tech., Cambridge.
SOLID STATE DISPLAY PANELS WITH PHOTOCONDUCTIVE CONTROL, by R. R. Billups, J. Rothstein, and W. L. Gardner, Jr. Rept. on Contract AF 19(604)5200. 26 May 60, 30p. 21 refs. Technical rept. no. 223; AD-243 854.
Order from LC mi$2.70, ph$4.80 PB 152 409

A solid state display panel is basically composed of two elements: one which detects the incoming signal and controls the voltage division and the other, a light-emitting layer, which produces a visual display. Panels utilizing sintered photoconductive (PC) layers of CdS and CdSe as detectors and electroluminescent (EL) layers for the output have been built. The over-all performance and consequently the possible applications of such solid state display panels are determined by the electrical and optical characteristics of the components and the extent of the optical feedback between them. A single unified theory has been developed which accurately describes the observed characteristics of these display panels. Possible applications have been explored with some success, but at the same time limitations have been uncovered which emphasize the fact that further improvements in the materials are needed. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
TRANSWORD: A PORTABLE WORD GENERATOR FOR USE IN MEASUREMENT OF BIT ERROR DISTRIBUTION, by William G. Schmidt. Rept. on Contract AF 19(604)7400. 19 Oct 60, 9p. 2 refs. 25G-0019; AD-245 232.
Order from LC mi$1.80, ph$1.80 PB 152 721

The reliability of any digital data communications system is a function, in part, of the bit error rate of the system; the error distribution is usually obtained by a comparison technique in which a "word generator" is a prime piece of test gear. This paper describes a transistorized word generator which has been designed and constructed for the specific purpose of replacing the electron tube models with small, highly reliable transistorized units which would facilitate field measurement of error distributions. (Author)

Lockheed Electronics Co., Metuchen, N. J.
RESEARCH DIRECTED TOWARD DESIGN AND DEVELOPMENT OF EXPERIMENTAL DATA PROCESSING EQUIPMENT, by M. W. Woodruff. Interim scientific rept. on Contract AF 19(604)6104. Nov 60, 96p. 12 refs. AFCRL TN-60-1133.
Order from LC mi$5.40, ph$15.30 PB 152 935

This Laboratory is unique in that it houses a complete and complex data processing system which is employed as a facility for research in information processing and human decision. Essentially, the laboratory is a simulation facility designed for the purpose of conducting a program of studies in the field of aerospace surveillance on problems which may be experienced at any command and control level. In this way, by means of controlled experiments, problems related to threat evaluation, action selection, and decision making can be explored. The facility is capable of pursuing further research in other areas, particularly with problems of air traffic control, ground control intercepts, missile launch, and other types of command and control systems using various equipment component configurations. This report describes the technical improvements and engineering developments which have contributed to improved operational reliability and flexibility, and which have enhanced the system capability to simulate operational problems. (Author)

Melpar, Inc., Falls Church, Va.
TELETYPEWRITER GROUP AN/GGA-2(XW-1) by C. F. Nojtunik and T. K. Parks. Final rept. phase 2 on Contract AF 30(602)1555. 6 Mar 59, 172p. 10 refs. RADC TR-59-53; AD-213 783.
Order from LC mi$8.10, ph$27.30 PB 148 282

This report released for sale to the public 28 Dec 60.

The equipment is a synchronous transponder error-correcting device to be used in conjunction with standard Air Force teletypewriter communications facilities. The report contains a detailed description of the developed equipment, test procedures, results, conclusions and recommendations for future development activity. (Author)

Michigan U. Research Inst., Ann Arbor.
NONLINEAR ANALYSIS OF CROSSED-FIELD AMPLIFIERS, by Om P. Gandhi and Joseph E. Rowe. Technical rept. no. 37 on Contract DA 36-039-sc-78223. June 60, 48p. 8 refs. 2820-4T; AD-243 196.
Order from LC mi$3.30, ph$7.80 PB 152 995

A general two-dimensional large-signal theory has been developed for the magnetron forward-wave amplifier. This theory accounts for the effects of a number of variables, including magnetic field, beam position, circuit loss and space-charge forces. The above theory has been used to analyze the planar injection-beam magnetron amplifier under a wide variety of operating conditions. The effects of magnetic field, space-charge forces and stream thickness on the gain are calculated and discussed. The space-charge fields are calculated from the three-dimensional Green's functions for electrons in a rectangular box and these are then simplified to the two-dimensional case. The variation of the space-charge field in the magnetic-field direction is needed to analyze magnetron amplifiers with biperiodic circuits. Solutions of the general nonadiabatic equations are calculated and compared with the adiabatic solutions. A particular nonlaminar stream model is investigated. (Author)

Microwave Associates, Inc., Burlington, Mass.
HIGH REPETITION RATE BROADBAND DUPLEXER, by Emanuel L. Horn. Quarterly progress rept. no. 6, 15 Nov 59-15 Feb 60 on Contract DA 36-039-sc-78165. [1960] 22p. AD-241 916.
Order from LC mi$2.70, ph$4.80 PB 152 668

Measurements of arc loss and recovery time have been continued at low repetition rates. Tests performed with a quartz wafer type encapsulated window yielded the lowest arc loss achieved to date of 2.3% but with a corresponding recovery time of 46 microseconds. The test results also indicate that for equal values of recovery time at equal gas pressures, the quartz wafer encapsulated window is 1.2% lower in arc loss than an encapsulated window containing medium density quartz wool. An investigation was also performed to determine the distribution of the "mechanical" losses as opposed to the discharge arc loss of a mounted encapsulated window. The tests show that the discharge arc loss is only a fraction of the total losses measured. (Author)

Microwave Lab., Stanford U., Calif.
THE CENTIPEDE HIGH-POWER TRAVELING-WAVE TUBE, by M. Chodorow, A. F. Pearce, and D. K. Winslow. Rept. on Contract AF 30(602)1844. May 60, 53p. 8 refs. M. L. rept. no. 695; RADC TN-60-201.
Order from LC mi$3.60, ph$9.30 PB 152 937

The design details and performance characteristics of an S-band high-power traveling-wave tube are presented. Instead of a helix, this tube uses a periodic microwave structure for the purpose of reducing the electromagnetic wave velocity in the interaction region. The coupling between the sections of this periodic structure is obtained primarily by the negative mutual inductance of the reversed loops. The large number of coupling loops was the basis for the name "Centipede" This type of coupling provides for a fundamental component with a forward group velocity and a cold passband of approximately forty per cent. Typical results of the tube performance on the first model of the centipede are as follows: saturated half power bandwidth of slightly over 500 Mc centered at 2900 Mc (or about 18 per cent); peak power output of three megawatts; peak efficiency of 30 per cent; saturated gain of about 26 db. These results were for a pulsed beam at 130 kv with a perveance of 1.65×10^{-6}. Curves of the calculated impedance, the gain parameter C, and the small signal gain based on beam parameters and cold test measurements are presented as are curves of measurements of the tube performance. (Author)

Microwave Lab., Stanford U., Calif.
DETERMINATION OF ELECTRODE SHAPES FOR AXIALLY SYMMETRIC ELECTRON GUNS, by Kenneth J. Harker. Rept. on Contract AF 30(602)1844. Aug 60, 23p. 13 refs. M. L. rept. no. 733; RADC TN-60-202; AD-246 012.
Order from LC mi$2.70, ph$4.80 PB 152 938

The determination of the electrode shapes for an electron gun involves solving Laplace's equation subject to specified boundary values of voltage and normal field on an open curve. Past attempts to solve this problem for the case of axial symmetry by mathematical methods have met with considerable difficulties because the problem is improperly set and leads to unstable solutions. Following Garabedian, we have reformulated the problem in such a manner that it becomes properly set and applied it to a curvilinear space-charge limited flow gun. First, a conformal transformation is made which maps the beam boundary into a coordinate axis. The second step, which constitutes the essence of the method, is accomplished by making an analytic continuation of Laplace's equation and its boundary values into a fictitious complex domain. Laplace's equation, which is elliptic in the real domain, is thereby converted into a set of hyperbolic equations. This leads to a stable scheme of computation by finite differences. This method should find particular application to curvilinear flow guns, where the use of analogs, such as the electrolytic tank, requires the use of involved experimental techniques. This method is very general, however, being applicable to any configuration where the boundary conditions are given through analytic functions. If one desires, these specifications for the boundary conditions may be given implicitly, as, for example, through a set of differential equations. (Author)

Microwave Lab., Stanford U., Calif.
GENERAL STUDIES IN HIGH-POWER MICROWAVE CONCEPTS. Scientific rept. no. 24, 1 Apr-30 June 60, on Contracts AF 19(604)1930, AF 49(638)415, and AF 19(604)5226. Aug 60, 32p. M.L. rept. no. 745; AFCRL TN-60-974.
Order from LC mi$3.00, ph$6.30 PB 152 847

Contents:
Investigation of the behavior of velocity modulated electron beams in long gaps
Electron beam parametric amplifier
Crossed-field electron guns
Electrostatic beam type parametric amplifier
Electron beam interaction with a plasma
Plasma parametric amplifier
Plasma diagnostic techniques
Plasma confinement
Plasma studies
Thermal plasma
Noise in plasmas
Harmonic generation in plasmas
Cesium plasma tube materials and techniques
Ferrite nonlinear resonance
Ferrite frequency multiplication

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
INVESTIGATION OF A CIRCULAR WAVEGUIDE PERIODICALLY LOADED WITH STRAIGHT WIRES, by M. Ettenberg and T. Tamir. Rept. on Contract AF 18(600)1505. 15 Oct 59, 16p. 11 refs. Research rept. R-782-59; PIB-710; AFOSR TN-59-1298; AD-230 730.
Order from LC mi$2.40, ph$3.30 PB 152 652

The investigation of the properties of a periodically loaded line is described. This line, consisting of a circular guide with straight wires loading, is shown to be suitable for linear accelerators and traveling-wave tubes. The determination of the propagation characteristic and other pertinent measurements is described. The results show that the structure exhibits a fundamental slow backward harmonic, similar to the properties of an anti-Karp line. A discussion on the influence of various parameters indicates how an appropriate propagation curve may be designed by suitably proportioning the geometrical dimensions of the structure. (Author)

Naval Air Test Center, Patuxent River, Md.
EVALUATION OF IMPEDANCE PLOTTERS, by W. S. Bartels and F. B. Brown. Rept. no. 1 (Final) on Proj. TED no. PTR EL 9008. 29 Apr 58, 26p. 1 ref. Serial ET315-127.
Order from LC mi$2.70, ph$4.80 PB 152 833

Z-G Diagraphs, type ZDU (covering the frequency range 30-300 mc) and type ZDD (covering 300-2400 mc), were designed and manufactured to measure impedance, admittance, reflection coefficient, and transmission characteristics accurately and rapidly. This report is an evaluation of the capabilities of the Z-G Diagraphs for use as antenna test equipment.

Naval Ordnance Lab., White Oak, Md.
THE SELF IMPEDANCE OF A CIRCULAR LOOP IN A CONDUCTING MEDIUM, by M. B. Kraichman. 17 Aug 60, 13p. 3 refs. NAVWEPS rept. 7290.
Order from OTS $0.50 PB 171 353

Integral expressions are derived for the radiation resistance and external self inductance of a circular loop immersed in a conducting medium. These expressions are evaluated for the case where the radius of the loop is much smaller than a medium wavelength. The radiation resistance and external self inductance are expressed in terms of their values in air plus a correction term due to immersion. Values of the correction terms are plotted as a function of a loop-wave parameter. (Author)

Naval Research Lab., Washington, D. C.
A CLOSED CIRCUIT TV SYSTEM FOR PASSIVE USE AT NIGHT, by G. T. Hicks and C. M. Whitfield, Jr. Interim rept. 23 Nov 60, 18p. 7 refs. NRL rept. 5557.
Order from OTS $0.50 PB 161 968

Experiments were performed with a closed-circuit TV system designed for applications involving nighttime viewing. Various lenses and recently improved TV camera tubes designed for low light levels can be used in the system. Aero-Ektar 24-inch f/6 and 12-inch f/2.5 lenses can be used with the RCA C-73410 image orthicon tube, the RCA C-73477 image intensifier orthicon tube, or the General Electric Z-5294 image orthicon tube, and a 10-inch-diameter Schmidt optical system can be used with the C-73477 tube. Information is displayed in final form on a 10-inch monitor screen at a luminance level adequate for conventional photography or for viewing without the necessity of prior dark adaptation of the eyes. The system was tested under low light level conditions on rocket flights, outdoor scenes, stars, and a resolution chart. The highest sensitivity was obtained with the Schmidt collector and the C-73477 tube, visibility thresholds being about the same as for a dark-adapted eye with a 7 x 50 binocular. The use of storage would increase the sensitivity beyond that of the dark-adapted eye. Under these moonlight to starlight conditions, the pictorial results indicate that these new camera tubes have a sensitivity increase of 20 to 100 over studio-type camera tubes. (Author)

Naval Research Lab., Washington, D. C.
HARMONIC DISTORTION IN AMPLIFIERS, by S. R. Swanson and W. G. Long, Jr. Interim rept. 17 June 52, declassified 15 Dec 53, 15p. 12 refs. NRL rept. 3998.
Order from LC mi$2.40, ph$3.30 PB 153 576

This report released for sale to the public 6 Jan 61.

To correlate nonlinear distortion with the various parameters in vacuum-tube circuits and to determine methods for reducing this distortion, a theoretical analysis, supported by experimental measurement, was made of amplifier and cathode-follower circuits. The analysis shows that under certain operating conditions minimums may exist for the various harmonics in a vacuum-tube circuit. These minimums do not ordinarily occur for different harmonics under identical operating conditions. Although measurements were made using 6AK5 and 6C4 tubes at audio frequencies, the analysis is also valid for broadband amplifiers at higher frequencies. Curves obtained experimentally illustrate the relation between harmonic distortion and such parameters as plate voltage, grid bias, and load resistance. For a limited range of operating conditions, second- or third-harmonic distortion will drop from an average value of several percent to less than 0.01 percent. (Author)

Naval Research Lab., Washington, D. C.
INTERMODULATION DISTORTION IN AMPLIFIERS, by S. R. Swanson. Interim rept. 4 Sep 52, declassified 15 Dec 53, 14p. 4 refs. NRL rept. 4037.
Order from LC mi$2.40, ph$3.30 PB 153 577

This report released for sale to the public 6 Jan 61.

Two components of the distortion produced in a wideband amplifier, such as a receiver multicoupler, are considered for the case when the input contains signals at two or more frequencies. These components of distortion are combination frequencies and cross modulation. The combination-frequency (also known as sum-and-difference-frequency) signals appear at frequencies which are the sum and difference of the input frequencies and their multiples. It is shown that the amplitude of these signals is related to the amplitude of the harmonic distortion produced in a nonlinear amplifier. With two input signals of approximately equal amplitude, the combination-frequency signals will be several times greater than the corresponding harmonics. Cross modulation or crosstalk is a result of the dependence of the amplification of one signal upon the amplitude of another signal in a nonlinear circuit, and causes modulation from one carrier to appear on another carrier. This effect is approximately proportional to the third-harmonic distortion produced by the interfering signal and is practically independent of the amplitude of the signal being interfered with. (Author)

Navy Underwater Sound Reference Lab., Orlando, Fla.
AN IMPROVED NOISE-MEASURING HYDROPHONE, USRL TYPE H32, by Claude C. Sims. 18 Oct 60, 15p. USRL Research rept. no. 52; AD-244 882.
Order from LC mi$2.40, ph$3.30 PB 152 979

A replacement hydrophone for the type DT-99/PQM-1A noise-measuring hydrophone is described. The sensitive element consists of a PZT5 ceramic cylinder with metallic diaphragms and "O" ring seals. The directional characteristics, signal-to-noise ratio, and stability with time are superior to those of the type DT-99/PQM-1A hydrophone. (Author)

New York U. Coll. of Engineering, N. Y.
DIGITIZED MAXIMUM PRINCIPLE, by S. S. L. Chang. Rept. on Contract AF 49(638)586. July 60, 9p. 6 refs. Technical rept. 400-14; AFOSR TN-60-600; AD-245 996
Order from LC mi$1.80, ph$1.80 PB 153 034

The maximum principle of Boltyanskii, Gamkrelidze, and Pontryagin for minimal time or maximal range control of nonlinear continuous systems can be readily extended to sampled-data systems. This note states and derives such a digitized version of the maximum principle.

New York U. Coll. of Engineering, N. Y.
OPTIMUM DESIGN OF PASSIVE-ADAPTIVE LINEAR FEEDBACK SYSTEMS WITH VARYING PLANTS, by Paul E. Fleischer (Doctoral thesis). Rept. on Contract AF 49(638)586. Aug 60, 15p. 12 refs. Technical rept. 400-16; AFOSR TN-60-748; AD-245 997.
Order from LC mi$2. 40, ph$3. 30 PB 153 035

In designing a feedback control system involving a variable (or incompletely known) plant the prime consideration, besides obtaining a satisfactory transfer function, is to specify a system which is insensitive to plant variations. Some procedures for obtaining insensitive designs have been described in the literature, but they all result in systems having large open loop bandwidths. In the presence of instrument noise such systems would tend to produce an excessive noise output. In this paper a minimization is carried out, where the conflicting requirements of small sensitivity to plant variations and insensitivity to instrument noise are satisfied simultaneously. The solution is approximate, but can be justified in most physical situations. A method for iterating the solution is also described. (Author)

New York U. Coll. of Engineering, N. Y.
RELIABLE FAIL-SAFE BINARY COMMUNICATION, by J. J. Metzner and K. C. Morgan. Scientific rept. no. 2 on Contract AF 19(604)6168. 10 July 60, 76p. 40 refs. AFCRL-TN-60-791; AD-245 253.
Order from LC mi$4. 50, ph$12. 30 PB 152 791

A new binary decision-feedback system is described which is very effective for high reliability transmission when the channel is subject to fading, intermittent strong noise bursts, or other changing conditions. The results presented suggest that this problem can be solved by employing long codes with feedback, correcting only very small numbers of errors, and utilizing a new technique which effectively prevents any type of disturbance in the feedback channel from harming system reliability. The resulting system yields excellent reliability, "fails safe" (an error probability of 10^{-10} when the signal-to-noise ratio falls to zero, for instance), and operates at a relatively high per-symbol information rate. This approach is particularly effective in precisely those situations where less efficient procedures fail - namely, when severe burst-type noise or heavy fading is encountered. The cost of this performance, in terms of computing and storage requirements, is far less than that of comparable unidirectional systems. (Author)

Pacific Semiconductors, Inc., Culver City, Calif.
INTRINSIC-BARRIER TRANSISTOR TECHNIQUES (SILICON) by J. L. Buie, M. Millea, and R. C. Neville. Quarterly rept. no. 10, 15 Oct 59-15 Jan 60, on Contract DA 36-039-sc-74887. [1960] 25p. 3 refs. PSI rept. no. 3000:15-25-Q; AD-240 261.
Order from LC mi$2. 70, ph$4. 80 PB 152 659

During the past quarter photo-resist techniques have been applied to the processing of silicon mesa transistors. Procedures are given for the photo-resist techniques. These are found adequate to produce one-half mil transistor electrode structures. A useful technique for study of transistor defects is given. By this means a defective spot or spots on a transistor may be observed by local melting of a temperature-sensitive wax. Impurity diffusion techniques are discussed. Some changes in prior processes are discussed with resulting overall improvement. Gold diffusion is also described. This technique has been introduced into the diffusion processing in order to control lifetime in the transistor and observe effects upon device performance. (Author)

Physical Science Lab., New Mexico State U., University Park.
AN INVESTIGATION OF LOOP ANTENNAS AND A FEASIBILITY STUDY OF ANTENNAS SUITABLE FOR THE DOFL MISSILE CONFIGURATION, by G. E. Johnson. Rept. on Contract DA 49-186-502-ORD-708. 1 Dec 59, 99p. 10 refs. AD-234 629.
Order from LC mi$5. 40, ph$15. 30 PB 149 647

Loop antennas designed on the basis of mode theory developed by Dr. Julius Herman, Diamond Ordnance Fuze Laboratories, were tested and compared with predicted results. Agreement between calculated and measured values of impedance is good indicating that mode theory is useful in predicting impedance of thin loop radiators. The theory also allows design of large uniform current loops for omnidirectional linear antennas useful in direction finding, arrays, and null seeking systems. Results of testing various antenna configurations on ten-foot missile forms to produce a pattern directed forward along a missile axis but with an on-axis null and low back and side lobe level are given. An optimum pattern is produced by an array of 2 antennas exciting the missile body as a long wire radiator at approximately 300 mc. (Author)

Raytheon Co., Waltham, Mass.
DEVELOPMENT OF COMMUNICATIONS REFLEX KLYSTRON TUBE QKK725/QK645, by Sidney S. Taylor. Final rept. for 25 Mar 57-31 Mar 59 on Contract DA 36-039-sc-73197. [1959] 36p.
Order from LC mi$3. 00, ph$6. 30 PB 149 629

The cavity, cathode and reflector spacing, and much of the internal structure of the QK422 was changed to meet the specifications of the QKK725. The output section and the tuning mechanism were redesigned to meet the QKK725 requirements. Shock and vibration tests were taken. Tuner hystersis was improved. Dimensional and tuning limits were measured. The electrical characteristics of the tube were evaluated. (Author)

Raytheon Co., Waltham, Mass.
DEVELOPMENT OF X-BAND PULSE-TYPE MAGNETRONS QK674, QK675, QK705, by S. Beese and R. Giuliano, ed. Quarterly engineering rept. #2, 19 Jan-1 May 59, on Contract DA 36-039-sc-78150. [1959] 17p.
Order from LC mi$2. 40, ph$3. 30 PB 149 630

This project concerns the development of three rugged ized miniature X-band pulse magnetrons each capable of generating a peak power output of 60 watts. Each tube is to be mechanically tunable through the frequency bands shown below. QK705; 8900 - 9100 Mc, QK674; 9100 - 9300 Mc and QK675; 9500 - 9700 Mc. Anode dimensions were established and operable models of all three tube types were constructed. The hot test and environmental tests results indicate that the tube designs will be able to meet specifications.

Rome Air Development Center, Griffiss AFB, N. Y.
RADC RELIABILITY NOTEBOOK. SUPPLEMENT 1. 1 Sep 60, 215p. 48 refs. [RADC-TR-58-111, Sup. 1].
Order from OTS $3.50 PB 161 894-1

This revision of Section 8 of the basic notebook (PB 161 894) supersedes the original section. It includes sections on reliability fundamentals; essential premises associated with reliability evaluation; rules for establishing risk values; part failure characteristics; electron tubes; semiconductor components; resistors; capacitors; stress analysis for capacitors; transformers, magnetic amplifiers, inductors and coils; rotary electrical devices; connectors; relays and switches; wire and cable; low population parts; procedural routine for failure-rate summation; interpretation of total failure rate from system viewpoint; reliability specification and proof; classification of failures; mathematical and physical basis for reliability stress analysis; thermal aspects of equipment design; and comparison of calculated and observed reliabilities.

Scnotone Corp., Elmsford, N. Y.
STUDY OF SEALED NICKEL-CADMIUM BATTERIES, by Irwin M. Schulman and Paul Ritterman. Quarterly rept. no. 3, 1 June-31 Aug 59, on Contract DA 36-039-sc-78249. [1959] 63p. 12 refs. AD-229 738.
Order from LC mi$3.90, ph$10.80 PB 149 693

The life cycling program was continued using D hermetically sealed cells with varying concentrations and amounts of electrolyte. Results are shown of periodic capacity tests made during the cycling program. Positive and negative plaques were processed for the experiment which will test the effects of cobalt addition to the positive plates, lithia addition to the electrolyte, and the varying of negative/positive capciaty ratios. Charge and discharge data are presented for a 3 plate cell (2 negative - 1 positive) in a sealed chamber under pure oxygen atm at 10, 25 adn 50 psig and under the ambient atm. A revised program for reaction mechanism study is presented. (See also PB 145 802)

Stanford Research Inst., Menlo Park, Calif.
APPLIED RESEARCH IN MICROMINIATURE FIELD EMISSION TUBES, by W. W. Hansen. Quarterly progress rept. no. 3, 1 Jan-1 Apr 60, on Contract DA 36-039-sc-84526. May 60, 34p. SRI Project 2937; AD-240 959.
Order from LC mi$3.00, ph$6.30 PB 152 670

A vacuum chamber and micro-manipulator for experimental study of field-emission tubes is described. Performance and defects of the manipulator have been evaluated, and remedial measures proposed. A vacuum of about 5×10^{-9} mm was obtained during the first pumpdown and suggestions for improvement are made. An emitter tip was successfully maneuvered into one hole of a 1000-mesh screen, but emitter stability was insufficient to warrant a detailed determination of control characteristics. Theoretical studies of tube characteristics were extended, and deflection of electrode structures due to electrical fields was estimated. (Author)

Sylvania Electric Products, Inc., Seneca Falls, N. Y.
THE DEVELOPMENT OF THE LOW-HEATER-POWER CATHODE-RAY TUBE SC-2751, by George R. Kautz. Final rept. for 1 July 58-1 July 59 on Contract DA 36-039-sc-78135. [1959] 108p. Rept. no. PSD59-4; AD-231 127.
Order from LC mi$5.70, ph$16.80 PB 149 712

The methods and techniques of fabricating a low-power heater-cathode assembly were satisfactorily worked out to a degree where limited volume production can be accomplished. Isolation of heater and cathode is the major problem in the manufacture of tubes incorporating the low-power heater assembly. However, it was demonstrated that approximately 60% of the assemblies can be made with heater-cathode leakage within satisfactory limits. The SC-2751 tube appears to meet all design characteristic specifications. Revisions made in specifications have resulted in an improved tube for face plate quality, anode insulation, and equipment adaptability. Some revisions in inside bulb contour in the CD region are necessary to completely eliminate neck shadow. It is expected that modifications now being proposed will be a satisfactory solution to this problem. The final design of this low-heater-power assembly operates at 1.5 v - 140 ma.-and 750°C cathode temperature. This assembly, with appropriate mounting, is interchangeable with standard heater-cathode assemblies in all normal types of cathode-ray tubes.

Syracuse U. Research Inst., N. Y.
THE REPRESENTATION OF NON-LINEAR NETWORKS, by J. Blackman. Scientific rept. no. 1 on Time Response Characteristics of Linear Networks and Transformation Methods in Network Synthesis, Contract AF 19(604)6142. Aug 60, 11p. 2 refs. AFCRL TN-60-995.
Order from LC mi$2.40, ph$3.30 PB 152 986

The main purpose of this paper is to prove a theorem which provides a theoretical background for approximating the performance of continuous, non-linear, single valued networks. To do this an appropriate mathematical framework is supplied and, incidentally, a theorem is proved which demonstrates that the well-known convolution integral which describes the performance of a linear network is the consequence of a few very general assumptions.

Technical Research Group, Somerville, Mass.
DEFOCUSING OF PARABOLOIDS FOR MAXIMUM TRANSFER OF ENERGY TO A RECEIVER IN THE FRESNEL ZONE, by Alan F. Kay. Scientific rept. no. 131-2 on Contract AF 19(604)5532. 29 Apr 60, 11p. 1 ref. TRG-131-RS-2; ERD-TN-60-782.
Order from LC mi$2.40, ph$3.30 PB 152 776

For the general case of aperture antennas it has been shown how to design the amplitude and phase of the aperture illuminations of the transmitting antenna and, in the case that there is one, of the receiving antenna in order to maximize the ratio P_R/P_T of power received to power transmitted. The optimum illuminations are ones which may often be accurately approximated by paraboloidal reflectors with defocussed feeds. This report is concerned with the validity of this approximation, i.e. to what extent can defocussed paraboloids realize nearly maximum energy transfer.

Trans-Tech, Inc., Rockville, Md.
IMPROVED FERROMAGNETIC BODIES FOR USE IN MICROWAVE DEVICES. Final rept. for 15 Dec 56-15 15 Jan 59 on Contract DA 36-039-sc-73124. [1959] 56p. AD-213 228.
Order from LC mi$3.60, ph$9.30 PB 153 226

The nickel-cobalt-copper-aluminium ferrite system was investigated as a general study of materials for the microwave region below 3, 000 megacycles per second. Certain compositions from this system were also investigated as a gyromagnetic ratio study. Polycrystalline yttrium iron garnet comprising slight variations from stoichiometric proportions were investigated. Calcium oxide-silicon oxide substitutions were effected in yttrium garnet in the hope of lowering the sintering temperature. The lead bath method of growing single crystals of yttrium iron garnet was investigated. A reproducibility study was conducted and the effects of different amounts of impurity in the magnesium-manganese ferrite are presented. Flame spraying equipment was assembled and nickel ferrite, nickel cobalt ferrite and yttrium iron garnet were prepared and compared to materials prepared by ball-milling. An evaluation of the materials designed and fabricated under the subject contract is presented, based on electronic measurement of pertinent microwave characteristics and other characterizing measurements. (Author)

Willow Run Labs., U. of Michigan, Ann Arbor.
ELECTROLUMINESCENT-PIEZOELECTRIC FLAT-PANEL DISPLAYS, by S. Nudelman, J. Lambe and others. Rept. on Proj. Michigan, Contract DA 36-039-sc-78801. Oct 60, 13p. 1 ref. Rept. no. 2900-202-T; AD-245 182.
Order from LC mi$2.40, ph$3.30 PB 152 536

A display panel consisting of electroluminescent phosphors deposited on piezoelectric crystals has been fabricated for the purpose of providing a controlled luminescent light spot. The scheme of operation provides for light-spot generation by using the electric fields generated at the piezoelectric-crystal surface, when the crystal is driven by voltages applied at the resonant frequency. The panel is made up of crystals connected electrically in parallel, but resonating at different frequencies. Light-spot sweep movement over the face of the panel and intensity variation are derived by frequency and amplitude modulation of the voltage applied to the piezoelectric crystal array. The device can be used immediately in the development of computer switches, character displays, luminescent dials, delay lines, and any displays requiring limited electric-field bandwidths. After additional phosphor research, it may have uses in the development of TV-like displays. (Author)

Ordnance, Missiles, and Satellite Vehicles

Aeronautical Accessories Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.
VAPOR CYCLE COOLING SYSTEMS FOR SPACE VEHICLES, by T. D. Moseley. Rept. on Aircraft Air Conditioning. July 60, 27p. 1 ref. WADD Technical note 60-161.
Order from OTS $0.75 PB 171 345

Investigation of vapor cycles using freon 11 and cycles using water as refrigerants for space vehicle cabin cooling at approximately 75°F and electronic equipment cooling at approximately 150°F revealed similar performance in the two refrigerants, but due to the high compression ratios required, water was undesirable. Optimum total radiator area for the combination of vapor cycle systems with necessary power units resulted at 250°F to 325°F radiator temperature for cabin cooling and 270°F to 350°F for electronic equipment cooling (temperatures were based on a power efficiency of 20 percent and heat rejection or radiator temperature of 700°F). High power unit efficiencies, high power unit radiator temperatures, and high cooling system Carnot cycle efficiencies reduced radiator area. (Author)

Air Force Missile Development Center, Holloman AFB, N. Mex.
AERODYNAMIC MEASUREMENTS ON TWO ROCKET SLEDS ON THE HOLLOMAN TRACK COMPARED WITH THEORY AND WIND TUNNEL RESULTS, by Hans J. Rasmussen. July 60, 54p. 14 refs. AFMDC-TR-60-22.
Order from LC mi$3.60, ph$9.30 PB 152 743

Measurements of pressure distribution and of free run drag coefficients were conducted during checkout runs of two liquid propelled rocket sleds on the Holloman Track. Data were obtained on a vehicle of hexagonal body cross section with a pointed nose (RS-2 sled) at free stream Mach numbers up to M = 1.1, and on a vertical wedge slab configuration with rounded leading edge and flat bottom and top surfaces (AJ 10-33 sled) at free stream Mach numbers up to M = 1.5. The results are compared with theory and wind-tunnel measurements. The over-all agreement between sled measurements and wind-tunnel data is good, and the general trend is the same in both sled and wind-tunnel results The flow characteristics around both configurations, as revealed by these measurements, are discussed in detail. Blockage effects observed on the RS-2 sled in the vicinity of slipper beams and sway braces emphasize the need for proper angular orientation of slipper beam fairings with respect to the local flow direction

and indicate that sway braces are highly undesirable on supersonic sleds. Discontinuities in the pressure field on top and bottom of the vertical wedge slab nose were observed at transonic speeds. They were attributed to changes in local Mach number distribution, which are induced by cross flow effects from the side surfaces. Free run drag coefficients are compared with design assumptions and wind-tunnel results. (Author)

Army Chemical Research and Development Labs., Army Chemical Center, Md.
GRENADE, HAND, IRRITANT, CN-DM, E17R1, by Woodrow W. Reavens and Kenneth G. Carlon. Aug 60, 16p. 2 refs. CRDLR 3019; AD-243 461.
Order from LC mi$2.40, ph$3.30 PB 152 597

An experiment was conducted to determine ways to improve the stability of the M6 grenade. Various designs were investigated in an attempt to develop a suitable item that would agree with the military characteristics. The most appropriate design consists of a standard M18 grenade can containing two thin-wall metal canisters for the irritant mixtures. The canisters are 1.95 inches in length and 2.281 inches in outside diameter. The grenade is assembled as described below. An asbestos gasket is placed on the bottom of the grenade can. Above this is placed the CN canister so that the exposed surface faces the bottom of the grenade casing. A polyethylene disc is placed on top of the canister followed by another asbestos gasket. The DM canister is then inserted with the exposed surface facing the top of the grenade. Enough asbestos gaskets are then placed on the DM canister to ensure a tight fit when the grenade is sealed. The grenade is functioned with the standard M201A1 grenade fuze. Preliminary testing of the above design gave satisfactory burning performance and storage stability. Surveillance was conducted at 140°F and 160°F. It was determined experimentally that intimate blends of CN, DM, and fuel mixtures were not stable at elevated temperatures. Physical separation of fuel-CN and fuel-DM mixtures in the munition was determined to be the optimum method for producing a satisfactory stable munition. (Author)

Army Chemical Research and Development Labs., Army Chemical Center, Md.
IMPROVEMENT STUDY FOR INCENDIARY SAFE AND EQUIPMENT DESTROYER, M2A1, by Woodrow W. Reaves and John J. Blissel. Aug 60, 12p. CRDL Special pub. 1-21. AD-243 614.
Order from LC mi$2.40, ph$3.30 PB 152 596

This report covers work conducted to improve the storage, handling, and functioning characteristics of the M2A1 incendiary safe and equipment destroyer. Formulations containing a resinous binder, Laminac 4116, were investigated. (Author)

Army Chemical Research and Development Labs, Army Chemical Center, Md.
THE TECHNICAL FEASIBILITY OF UTILIZING THE M5 HC SMOKE POT FOR LAYING SMOKE SCREENS FROM LIGHT-WEIGHT AIRCRAFT, by Mitchell E. Penn. July 60, 11p. 1 ref. CRDL Special pub. 1-20.
Order from LC mi$2.40, ph$3.30 PB 152 595

The object of the work described in this report was the investigation of the feasibility of using the M5 HC smoke pot for laying smoke screens from lightweight Army aircraft. Two kits, which allow an M5 HC smoke pot to be dropped from low-flying aircraft or moving vehicles or trailers, were developed. The E2 modification kit for the vehicular-dissemination smoke pot consists of two aluminum end plates, appropriate tie rods, and a bouchon fuze (M201A1). The E3 modification kit for the aircraft-mounted smoke pot is similar to the E2 kit, except for the addition of two bomb lugs with sway braces. It is feasible to use low-flying lightweight aircraft or moving ground vehicles to lay pyrotechnic smoke screens using appropriately modified M5 HC smoke pots. (Author)

Arnold Engineering Development Center [Tullahoma, Tenn.]
DRAG AND STABILITY DERIVATIVES OF MISSILE COMPONENTS ACCORDING TO THE MODIFIED NEWTONIAN THEORY, by J. Don Gray. Rept. on ARO, Inc., Contract AF 40(600)800 S/A 11(60-110. Nov 60, 33p. 2 refs. AEDC TN-60-191.
Order from LC mi$3.00, ph$6.30 PB 153 058

The modified Newtonian approximation for the pressure distribution on bodies in hypersonic flow has been used to derive expressions for the zero-lift drag and the initial slopes of the normal-force and pitching-moment curves. From the general expressions developed, a set of working graphs are presented for blunted cones, truncated cones, spherical segments, and rounded-shoulder cylinders. From these graphs and the appropriate equations, also given herein, the drag and static-stability derivatives of composite missile configurations may be readily estimated. (Author)

Ballistic Research Labs., Aberdeen Proving Ground, Md.
AN ALIGNMENT CHART FOR THE DIRECT DETERMINATION OF GUN CHARGES IN INTERIOR BALLISTIC CALCULATIONS, by R. C. Strittmater. Aug 60, 7p. 1 ref. Memo. rept. no. 1299; AD-245 205.
Order from LC mi$1.80, ph$1.80 PB 152 732

An alignment chart has been developed which eliminates the process of iteration when solving for the weight of gun charges in interior ballistic calculations. (Author)

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE EFFECT OF ATMOSPHERIC PRESSURE ON THE REFLECTED IMPULSE FROM AIR BLAST WAVES, by W. C. Olson, J. D. Patterson, II and J. S. Williams. Jan 60, 19p. 10 refs. Memo. rept. no. 1241; AD-234 998.
Order from LC mi$2.40, ph$3.30 PB 149 633

Measurements are reported of reflected impulses in air blast waves generated by explosive spheres (up to one pound in weight) detonated under reduced ambient pressures simulating altitudes up to 100,000 ft. (8 mm of mercury). Analysis reveals that the data scale according to Sachs' law. (Author)

Ballistic Research Labs., Aberdeen Proving Ground, Md.
HYPERVELOCITY IMPACT BY COLLISION OF TWO PROJECTILES, by Walter K. Rogers, Jr. and Walter S. Vikestad. Aug 60, 20p. Technical note no. 1337; AD-245 209.
Order from LC mi$2.40, ph$3.30 PB 152 729

A high collision velocity was achieved by firing a steel pellet from a small light-gas gun at a target disc fired from a large smooth-bore gun. The technique exploits the use of existing equipment to reach hypervelocities in a range where the need for impact data is urgent. This report discusses the technique, instrumentation and results of the experiment. Collisions were predicted with reliability and precision. The experiment demonstrates the feasibility of adding significant target velocity to many hypervelocity launching techniques. (Author)

Bliley Electric Co., Erie, Pa.
PRECISION CRYSTAL UNITS FOR SATELLITE USE, by J. M. Wolfskill, R. T. Schlaudecker, and Robert Mouck. Quarterly progress rept. no. 3, 1 Jan-31 Mar 60, on Contract DA 36-039-sc-84556. [1960] 23p. 5 refs. AD-240 687.
Order from LC mi$2.70, ph$4.80 PB 152 673

The fabrication of sample crystal units is continuing with the inclusion of 100 mc and 111 mc units, and the utilization of the fifth, seventh, and ninth overtone mode crystals. The most difficult of the requirements to meet proved to be the stringent maximum effective resistance levels and the tight frequency-temperature stability characteristics demanded, although the aging rate requirement also poses severe problems. It was found possible to fabricate fifth mode crystals which will meet the 25 ohm requirement, and also to make seventh mode crystals which will meet their 35 ohm value. The latter is true only if aluminum plating is utilized. Only a few of the ninth mode units were produced which could meet the specified 45 ohm level. It was found that achievement of crystal units which can hold the required $\pm 2 \times 10^{-6}$ frequency stability over the $0^{\circ}C$ to $55^{\circ}C$ operating temperature range can be accomplished only by individual selection. Investigation has indicated that some distortion of normal temperature characteristics occurs when crystals are mounted in the special dual channel mounting. This was traced to variations in the solder mounting. Studies were made to determine the practicability of influencing drift characteristics to improve yield by controlled variations in the mounting. Work was expanded to include evaluation of a parallel field excitation technique to achieve high stability. Necessary test equipment for this phase of work is described.

Dynamic Simulations Lab., Ordnance Tank-Automotive Command, Center Line, Mich.
MATHEMATICAL MODEL AND DIGITAL COMPUTER PROGRAM FOR VEHICLE FIRING STABILITY ANALYSIS (ACTIVE SUSPENSION) by Carole M. Fischer. Rept. on Contract DA 20-089-ORD-39246. 12 July 60, 82p. 2 refs. Rept. no. RR-27; AD-245 581.
Order from LC mi$4.80, ph$13.80 PB 152 845

This report describes the establishment of a mathematical model and digital computer procedure for conducting comprehensive firing stability studies of vehicle mounted weapon systems. Program results include vehicle vibration, acceleration, velocity, and displacement data at any time increment during the application of the gun firing force impact. (Author)

Electro-Optical Systems, Inc., Pasadena, Calif.
ALL SKY SURVEILLANCE SYSTEM FOR SATELLITE DETECTION, by Peter H. Escher and Gunnar P. Michelson. Rept. on Contract AF 19(604)4565. 25 July 60, 173p. 4 refs. EOS rept. 290-final; AFCRL-TR-60-407; AD-246 037.
Order from LC mi$8.10, ph$27.30 PB 153 100

The feasibility of an electro-optical Sky Surveillance System affording hemispherical coverage for the acquisition and tracking of unannounced satellites is established. A design employing a detector mosaic in configuration with a scanning telescope is advanced. In its first version, the design will be capable of acquiring and subsequently tracking unknown satellites displaying a brightness equalling a third order of magnitude star or better. For relatively small additional cost the same design can be enabled to detect objects of the fifth or sixth stellar magnitude by a simple numerical increase of detector cells within the detector mosaic and a corresponding increase of preamplifiers and decision making discriminator circuits. The outputs of the discriminator circuits are sampled by an electronic commutator. Output pulses announcing the presence of a target and identifying which of the individual cells within the detector mosaic has made the acquisition are telemetered to the ground together with telescope position information. This data, which may be presented on a conventional PPI scope, will furnish vector information of a satellite, hence will make the establishment of its orbital trajectory possible. (Author)

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RADIATIVE PROPERTIES OF SURFACES CONSIDERED FOR USE ON THE EXPLORER SATELLITES AND PIONEER SPACE PROBES, by W. S. Shipley and T. O. Thostesen. Rept. on Contract DA 04-495-ORD-18. 15 Feb 60, 31p. 6 refs. Memo. no. 20-194; AD-236 593.
Order from LC mi$3.00, ph$6.30 PB 153 885

This report released for sale to the public 19 Jan 61.

Spectral reflectance data in graphical form and absorptance-emittance data in tabular form are presented for surface materials considered for use on the Explorer satellites and Pioneer space probes. The surfaces ranged from bare aluminum, titanium, and stainless steel to painted coatings, coatings of Rokide A, and anodized and plated coatings. A brief review of the temperature control problem is presented as background information. (Author)

Kearfott Co., Inc., Little Falls, N. J.
STUDY OF TESTING OF CONTROL SYSTEMS UNDER SIMULATED ENVIRONMENTS, by S. L. Spira. Final rept. on Contract AF 29(600)2059. Aug 60, 263p. 105 refs. AFMDC-TR-60-19.
Order from LC mi$11.10, ph$41.10 PB 152 778

This report includes an analysis of the environments that can be expected during storage, transportation and tactical operation of advanced flight vehicles. The study carries through into methods of simulating these environments and determination of their deteriorating effects on control systems as they affect the performance and structural reliability. Thus, the environments include the natural surroundings to be encountered as altitude, various radiations, ionized layers, solid particles, temperature and gravity. The induced surroundings of shock and vibration are discussed in relationship to materials, assemblies, subassemblies and components of systems as well as the total systems. Material fatigue has been analyzed from the best information available. The test devices for simulating the environments have been reviewed to determine their effectivity in evaluation of hardware. These simulation tools include rocket sleds, shakers, bouncers, vibrators, centrifuges, and temperature - altitude chambers. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AMPLITUDE CALIBRATION FOR REENTRY PHYSICS PROGRAM: ARBUCKLE NECK RADARS, by B. G. Kuhn Rept. on Contract AF 19(604)7400. 19 Sep 60, 44p. 21G-0015.
Order from LC mi$3.30, ph$7.80 PB 152 759

Lockheed Aircraft Corp., Sunnyvale, Calif.
ON THE ORBITAL PERTURBATIONS OF MARTIAN SATELLITES, by Leighton F. Koehler. Technical note on Physics. July 60, 15p. 4 refs. LMSD-703029; AD-240 909.
Order from LC mi$2.40, ph$3.30 PB 152 939

Lowell Technological Inst. Research Foundation, Mass.
POLAR SATELLITE PROPAGATION MEASUREMENTS, by Carlisle Dieter, Kenneth Kinnard and others. Rept. on NSF Grant no. Y/32.48/272 and Scientific rept. no. 1 on Contract AF 19(604)4156. May 60, 68p. AFCRL TN-60-647; AD-244 582.
Order from LC mi$3.90, ph$10.80 PB 152 522

The satellite receiving station at Thule, Greenland and the electronic equipment used there for receiving and recording satellite signals are described in detail in this report. The location of the Polar Laboratory and the difficulties encountered in the operation of this Artic Field Station are presented. A comparison is made of the system designed at the Lowell Technological Institute Research Foundation which is now installed at Thule and the older system used prior to May 1959. This report contains a complete description of the Lowell Technological Institute Research Foundation system which was used for all 1958 Delta II recording since May 1959. A preliminary analysis of the data obtained from Thule is presented with suggestions for future work. Phenomena such as around the world transmissions or "ghost signals", scintillation, doppler effect and Faraday Fading are discussed in terms of the existing Thule data. Finally, a procedure is outlined for the determination of the parameters of the satellite orbit at the point of closest approach. Quantities, such as height of satellite, time of arrival and distance from Thule are calculated. (Author)

Naval Ordnance Lab., White Oak, Md.
SMEAR-CAMERA TECHNIQUES, by T. P. Liddiard, Jr. and B. E. Drimmer. 18 Aug 60, 21p. 20 refs. NAVWEPS rept. 7289; AD-246 590.
Order from OTS $0.75 PB 171 352

The various photographic systems and techniques used at NOL and other laboratories in conjunction with rotating-drum and rotating-mirror smear cameras are briefly discussed, and typical samples are shown of records obtained by such means. These techniques greatly increase the usefulness of such sweeping-image cameras in detonation and shock-dynamics research. (Author)

Naval Ordnance Test Station, China Lake, Calif.
PROCEEDINGS OF THE SUPERSONIC TRACK SYMPOSIUM [NO. 3] [HELD AT] CHINA LAKE, CALIFORNIA, SEPTEMBER 25-27, 1956, by James P. Judin. Seminar repts. and abstracts. [1956] 39p. STS-3.
Order from LC mi$3.00, ph$6.30 PB 153 867

This report released for sale to the public 19 Jan 61.

Contents:
Track operation and development
Flutter and structural stability
Instrumentation and measurements
Escape systems
Sled engineering and design
ISTRACON

Naval Ordnance Test Station, China Lake, Calif.
TRANSIENT TEMPERATURE DISTRIBUTIONS IN ROCKET MOTORS WITH COMPLEX CROSS SECTION, by P. A. Longwell. 1 Dec 59, 59p. 1 ref. NOTS TP-2521; NAVWEPS rept. 7098; AD-245 486.
Order from LC mi$3.60, ph$9.30 PB 152 826

A numerical method of calculation of the transient temperature distribution in propellant grains having complex cross sections is presented. Calculations for two shapes of internal burning grains are included as examples, and the temperature distributions during assumed curing cycles are given. (Author)

Remington Arms Co., Inc., Bridgeport, Conn.
DEVELOPMENT AND FABRICATION OF PERCUSSION PRIMER FOR BAG LOADED WEAPONS, by R. A. Sahlin and R. L. Bescher. Monthly progress rept. no. 4, Aug 60, on Contract DA 19-020-ORD-5200. 14 Sep 60, 5p.
Order from LC mi$1.80, ph$1.80 PB 152 839

During this period a field test was conducted in a 175 mm gun at Yuma, Arizona on two primer designs: (1) Picatinny basic design utilizing screw machine parts; (2) Remington second alternate utilizing a single drawn case with an external percussion primer. Remington developed wrap-around primer which prevents primer leakage. This design provides a simplification in manufacture and reduction in cost. (See also PB 152 259)

Remington Arms Co., Inc., Bridgeport, Conn.
DEVELOPMENT AND FABRICATION OF PERCUSSION PRIMER FOR BAG LOADED WEAPONS, by R. A. Sahlin and R. L. Bescher. Monthly progress rept. no. 5, Sep 60, on Contract DA 19-020-ORD-5200. 13 Oct 60, 5p.
Order from LC mi$1.80, ph$1.80 PB 152 840

During this period work has continued on two primer designs: (1) Picatinny basic design utilizing screw machine parts; (2) Remington first alternate utilizing a drawn body and a drawn combination container and ignition element with a staked closure cup and roll crimp. (See also PB 152 839)

Republic Aviation Corp., Farmingdale, N. Y.
COMPARISON OF SPECIAL PERTURBATION METHODS IN CELESTIAL MECHANICS, by Samuel Pines, Mary Payne, and Henry Wolf. Rept. on Contract AF 33(616)6449. Aug 60, 56p. 9 refs. ARL Technical rept. 60-281
Order from OTS $1.50 PB 171 337

The object of the investigation is to critically compare commonly used numerical methods for orbit computation. From the many methods available the following three were chosen: Cowell's method, Encke's method and the method of Variation of Parameters. Instead of comparing the methods against each other, with the attendant difficulty in deciding which of differing results is the more accurate, they were all compared with an exact solution of the problem of two fixed centers of gravitation. These three methods and the exact solution are described. The results of the comparison lead clearly to the conclusion that the Encke method is superior in all respects to the other two for a problem for which the classical two-body problem is locally a good approximation. For other problems, a modification of this method is indicated, rather than use of the Cowell method of the Variation of Parameters method.

Struthers-Dunn, Inc., Pitman, N. J.
DEVELOPMENT OF OPTIMUM RELAY STRUCTURES FOR GUIDED MISSILES, by H. J. Cullin and J. W. Bentz. Quarterly progress rept. no. 14, 1 Mar-31 July 59, on Contract DA 36-039-sc-64655. [1959] 25p.
Order from LC mi$2.70, ph$4.80 PB 149 704

The main effort during this interval has been directed toward the successful 15 ampere resistive load switching. Silver-cadmium-oxide type contacts have failed to perform consistently on 15 amperes but they do show good results while switching a 10 ampere load. Silver-molybdenum has also been tested as a contact but the results were unsatisfactory. Copper heat sink fixed brackets with a thin silver-cadmium-oxide face were tried in an effort to provide better conduction of the heat away from the contacting surfaces. With the results of this test it was reasoned that this was not the main problem.

Watertown Arsenal Labs., Mass.
BALLISTIC EVALUATION OF NICKEL STEEL PLATE AT LOW TEMPERATURE, by Charles W. Amos. July 59, 14p. 3 refs. Technical rept. no. WAL TR 711.2/1.
Order from LC mi$2.40, ph$3.30 PB 153 062
This report released for sale to the public 28 Dec 60.

Two 3/8"-thick 9% nickel steel alloy plates that conform to ASTM A353 alloy steel were subjected to ballistic shock impact with yawed caliber .50 AP M2 projectiles at a temperature of -165°C. The limited ballistic tests indicated that this special nickel steel exhibited good ballistic shock properties at considerably lower temperatures than those where brittle behavior occurs with heat-treated steels of the types employed for standard homogeneous steel armor, and at much lower temperatures than where brittle behavior occurs with low alloy high strength structural steels. The impact transition temperature of ASTM A353 nickel steel alloy is approximately -190°C. (Author)

Watertown Arsenal Labs., Mass.
IN-MOTION RADIOGRAPHY OF SERGEANT MISSILE MOTOR CASING, by Ernest H. Rodgers. Rept on Development of Remote X-Ray Inspection System. Oct 60, 14p. Technical rept. no. WAL TR 140.5/1.
Order from LC mi$2.40, ph$3.30 PB 152 988

Work on the in-motion radiography project was performed in an attempt to reduce the delay time resulting from the use of conventional radiographic techniques. The successful conclusion of the project resulted in decreased setup time, decreased exposure and processing time, ease of interpretation and considerable inspectional cost savings. (Author)

Sanitation and Safety Engineering

Naval Research Lab., Washington, D. C.
A DRY CHEMICAL SYSTEM FOR CARBON DIOXIDE REMOVAL FROM SUBMARINES, by S. H. Smith, Jr. Final rept. on one phase of problem. 23 Nov 60, 8p. 6 refs. NRL rept. 5563.
Order from OTS $0.50 PB 171 046

A system has been developed at NRL for the optimum utilization of packaged dry chemical CO_2 absorbers, to replace the current use of bulk quantities of loose absorbent. In this system, a self-enclosed filter-blower apparatus holds five canisters, each with six pounds of lithium hydroxide. Under normal conditions, the unit will absorb the CO_2 produced by 35 to 40 men over an eight-hour period. The most recent version of this unit is commercially designed and appears ready for fleet use. A concurrent investigation was made of the value of lithium hydroxide as compared with commercial sodalime as a CO_2 absorbent aboard submarines, using the filter-blower apparatus. Lithium hydroxide was found to be, as expected, substantially more efficient as an absorber of CO_2, with a capability of absorbing about 85 percent of its own weight in CO_2, as compared with about 40 percent for sodalime. (Author)

Naval Research Lab., Washington, D. C.
REMOVAL OF ORGANIC CONTAMINANTS FROM AIR BY TYPE 13X MOLECULAR SIEVE, by P. Gustafson and S. H. Smith, Jr. Final rept. on this phase. 6 Dec 60, 19p. 10 refs. NRL rept. 5560.
Order from OTS $0.50 PB 171 051

The adsorption of low concentrations of n-decane, methane, benzene, toluene, xylene, pyridine, aniline, and nitrobenzene on type 13X Linde molecular sieve has been studied at influent concentrations of from 5 to over 100 ppm and superficial linear velocities (velocities if no sieve were present to reduce the cross section) of up to 3000 cm/minute. The breakthrough weight capacity at a flow rate of 2500 cm/minute for a representative aliphatic compound (n-decane) was 10 wt-% of the sieve and for a mononuclear aromatic (benzene) was 0.35 wt-% at 25°C. Decreasing the flow rate of the aromatic to 500 cm/minute increased the breakthrough capacity to 2.1%. Regeneration conditions were also studied. Water vapor readily displaces organic adsorbates (except high boiling polar compounds) at room temperature. Therefore, molecular sieve with coadsorbed water may be reactivated by passing dry air at 200° to 325°C in the same direction of gas flow as that used during the adsorption cycle. The coadsorbed water will displace the sorbed organic compounds as it moves down the column, whereas the organic materials would be pyrolyzed in place if the water were not there. (Author)

Ship Building

David Taylor Model Basin, Washington, D. C.
MODEL EXPERIMENTS ON THE EFFECT OF A BULBOUS BOW ON SHIP SLAMMING, by Kazuo Ochi. Oct 60, 35p. 6 refs. Rept. 1360.
Order from LC mi$3.00, ph$6.30 PB 152 734

This report presents the results of model experiments to determine the effect of a bulbous bow on ship slamming. The experiments were conducted on two 5.5-ft models; one, the MARINER, had a bulb whose area was 4 percent of the midship area; the other, the modified MARINER, had the same principal dimensions as the MARINER but had no bulb. Based on the experimental results, a comparative evaluation is made of the effect of the bulb on slamming. It is found that the differences between the MARINER and the modified MARINER are not as large as had been expected. The MARINER appears to be superior to the modified MARINER at speeds less than 1.5 knots (14.7 knots full scale) and inferior to the modified MARINER at speeds above 2.0 knots (19.6 knots full scale). (Author)

Naval Engineering Experiment Station, Annapolis, Md.
A BIBLIOGRAPHY AND ABSTRACTS OF REPORTS ON RESILIENT MOUNTINGS, by Paul J. Shovestul. 25 Mar 59, 56p. 55 refs. E.E.S. rept. 820052; AD-215 988.
Order from LC mi$3.60, ph$9.30 PB 153 793

This report released for sale to the public 18 Jan 61.

This publication is a bibliographical review of all Engineering Experiment Station reports that have been published to date covering the development, investigation, and evaluation of resilient isolation mountings. The publication provides abstracts of each technical report issued concerning the isolation characteristics of specific resilient mounts.

FOOD, HANDLING, AND PACKAGING EQUIPMENT

Arctic Aeromedical Lab., Ladd AFB, Alaska.
NUTRITIONAL REQUIREMENTS OF TROOPS STATIONED IN ALASKA, by Kaare Rodahl. June 55, 107p. 81 refs. Proj. no. 7-7954, rept. no. 1.
Order from LC mi$5.70, ph$16.80 PB 153 339

A series of nutritional surveys, together with detailed clinical, physiological and biochemical examinations was carried out among a group of airmen and a group of Infantry soldiers during the four seasons of the year at Ladd Air Force Base in Alaska from 1950 to 1952. Simultaneously, similar studies were made among four groups of Eskimos for comparison. Individual food weighings showed an average gross consumption of 3,000 calories per man per day in the Air Force group and 3,200 calories in the infantry group. These findings are in striking contrast to figures previously published for caloric requirements of troops stationed in Alaska but are in agreement with studies among Eskimos and trappers in Greenland.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

Engines and Propulsion Systems

AeroChem Research Labs., Inc., Princeton, N. J.
SOME NOTES ON HIGH SPEED MEDIUM PROPULSION, by John B. Fenn. Rept. on Contract Nonr-2773(00). Mar 60, 20p. 10 refs. Technical memo. no. 21; AD-238 972.
Order from LC mi$2.40, ph$3.30 PB 148 777

There is a class of propulsion engines which depend upon the medium through which they fly for part of their working fluid. Under some conditions, they can also derive some of their energy from this medium. Air breathing engines are familiar members of this class. This study explores some of the implications of very high speed flight for these "medium propulsion" devices. A simple analysis based on energy, mass and momentum conservation is developed. No dependence upon particular mechanisms or processes is presumed. The following conclusions are reached: (1) As flight speeds are increased, the thrust yield per unit energy carried aboard the vehicle rapidly reaches impractically small values. (2) The yield in thrust from exhaustible stored mass rapidly increases with flight velocity. (3) In the range of achievable flight velocities simple mass addition to the exhaust stream without any energy addition can result in values of specific impulse comparable with the best chemical rocket propellants. (Author)

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE FEASIBILITY OF THE NUCLEAR POWERED ION PROPELLED SPACE VESSEL, by Donald McRae Mixson. Master's thesis. Mar 57, 95p. 20 refs. GNE [57]-5; Technical rept. 57-4.
Order from LC mi$5.40, ph$15.30 PB 153 587
This report released for sale to the public 16 Jan 61.

The feasibility of the ion rocket is investigated interms of its destination (Mars) and in terms of the ratio of payload to total ship mass. In order to achieve some perspective, the capabilities of the ion rocket are compared with those of chemical rockets. Assuming a 100-ton rocket under power for 114 days, it is determined that the ion accelerating potential must be 25,000 volts. With the ion acceleration efficiency established, the output of the DC generators is known, and the mass of these generators calculated -- assuming the substitution of aluminum for the generator copper. Once the input to the DC generators is known, the heat transfer system is investigated. The results of these calculations show that the 100-ton ship is feasible. The results are then scaled up for a rocket of 300 tons total mass.

Biomedical Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
EFFECTS OF VARIOUS EXHAUST BLAST DEFLECTORS ON THE ACOUSTIC NOISE CHARACTERISTICS OF 1,000-POUND-THRUST ROCKETS, by John N. Cole, Robert T. England, and Robert G. Powell Rept. on Definition and Modification of Acoustic and Vibrational Environments. Sep 60, 65p. 12 refs. WADD Technical rept. 60-6.
Order from OTS $1.75 PB 171 308

The sound field produced by rocket engines is affected by exhaust blast deflectors used in test and launch site operations. Whether or not these deflectors affect only directivity of noise radiation or also affect total acoustic power has been unanswered. Results of a blast deflector study using a 1,000-lb-thrust solid propellant rocket and scaled models of several types of deflectors are presented. Changes in acoustic power spectra, directivities, and near-field sound pressure level distributions derived from the study are included. Evaluations of a number of model diffuser noise suppressors designed for this 1,000-lb-thrust rocket and limited information on the acoustic effects of firing these rockets into water tanks with and without underwater blast deflectors are reported. Results indicate total power radiated can be appreciably reduced to varying degrees with the different deflectors (maximum total power level reduction of 8 db). However, almost all devices caused increases in the sound pressure level at near-field positions where the missile structure itself is located. Additional modification of the noise distribution at these near-field locations would be desirable to benefit from the achievable total PWL reductions. (Author)

Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio.
ROCKET-NOZZLE TESTING AND EVALUATION, by E. W. Ungar. [Rept. on Contract AF 18(600)1375]. 7 Dec 60, 17p. 3 refs. DMIC memo. 77.
Order from OTS $0.50 PB 161 227

This paper is concerned with the testing and evaluation of nozzles for solid-propellant rocket engines. Reproducibility of test results is discussed first. Then, the general problem of simulation of nozzle exposure conditions is covered. Finally, as an example of a simulation study, the results of a study of small-scale nozzle simulation are presented.

Diamond Ordnance Fuze Labs., Washington, D. C.
STATUS OF DOFL FUEL CELL PROGRAM ON 1 OCTOBER 1960, by H. F. Gibson. 24 Oct 60, 13p. 7 refs. Technical rept. TR-891; AD-245 220.
Order from OTS $0.50 PB 171 050

The objective, a brief history, the organization, and status of the DOFL fuel-cell program are given. The program represents the current Ordnance fuel-cell effort. The status of each of the different tasks is indicated along with brief statements of recent findings. References to details of the technical work are given for each task. References are given also to some other publications related directly to electrical vehicle propulsion. (Author)

Hesse-Eastern Div., Flightex Fabrics, Inc., Cambridge, Mass.
IMPROVEMENT OF HYDRODYNAMIC TEST MACHINE FOR ROCKET MOTORS, PARTS I AND II, by Paul V. Choate. Final summary rept. pts. 1 and 2 on Contract DAI 28-017-501-ORD(P)-1872. [1958] 181p. AD-144 442.
Order from LC mi$8.40, ph$28.80 PB 153 272

Research was conducted to provide an improved version of an established dynamic impact machine for use as a test device in the modification of current and design of future unfired pressure vessels for use as rocket motors; and to conduct metallurgical studies on 3.5-in. rocket motor bodies (namely, the M-28A2 HEAT rocket) to ascertain the possibility of reducing certain mechanical requirements presently incorporated in standard Ordnance drawings. The hydrodynamic test machine consists essentially of an energy source and a high pressure hydraulic system which converts the energy released from the source into the desired pressure-time cycle. The energy source (air gun) consists of a single stage, piston-type air compressor; an air storage tank capable of withstanding up to 125 psi air pressure; an acceleration tube or barrel; a slug; and appropriate valves to control the flow of air from the storage tank. Hydrostatic, hydrodynamic, and static firing tests were completed with the M28 motor made during the modification program of the hydrodynamic impact machine. This machine was evolved into a laboratory instrument which, through modification, may have the following uses other than that for which it was designed: (1) pressure gage calibration, (2) hydrodynamic test of shell cases, and (3) test for strength of joint.

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MOLLIER DIAGRAMS FOR THE HYDROGEN-OXYGEN SYSTEM AND EXPERIMENTAL RESULTS OF TESTS ON A ROCKET MOTOR OF 500-POUND THRUST, by Dwight I. Baker. Rept. on Contract DA 04-495-ORD-18. 4 May 59, 114p. 12 refs. Rept. no. 20-127; AD-228 095.
Order from LC mi$6.00, ph$18.30 PB 153 791

This report released for sale to the public 18 Jan 61.

The results are presented of experimental and analytical investigations of hydrogen and oxygen. Combustion-product properties and performance data for various

mixture ratios are given. Tests were conducted using water-cooled motors, and test results on a 100-lb-thrust motor are compared with test results on a 500-lb-thrust motor. Chamber pressures to 839 psia were obtained, and motors of 5.7- to 137-in. characteristic length were used. Mollier diagrams which were prepared from the theoretical data of hydrogen and oxygen are included in App. A. Corrections of the Mollier diagrams for recent data are given in App. B. (Author)

Plasma Propulsion Lab., Republic Aviation Corp., Farmingdale, N. Y.
OPTIMUM CAPACITOR CHARGING EFFICIENCY FOR SPACE SYSTEMS, by Philip M. Mostov, Joseph L. Neuringer, and Donald S. Rigney. Rept. on Contract Nonr-2851(00). 12 Jan 60, 33p. 11 refs. PPL-TR-60-2.
Order from LC mi$3.00, ph$6.30 PB 152 749

In space systems the efficient utilization of energy can be critical. Many pulsed operation devices, e.g., a plasma engine, involve charging a condenser periodically. The efficiency of energy transfer (η) to an initially uncharged condenser (C) when a DC source voltage is applied through a resistance (R), with inductance (L) assumed zero, is shown limited to 50% even if R varies arbitrarily during the charging process. If $L>0$, η can be made to approach 100% by charging in a periodic mode and terminating at the end of the first 1/2-cycle. The requisite L, which is a function of R, C, and charging time T, can be formidable and its weight large. To provide guide lines in the selection of practical voltage shapes, the Calculus of Variations is used to derive theorems for the "perfect" time-shaped source voltages that optimize η when the delivered energy, L, C and T are fixed. (Author)

Rocketdyne, Canoga Park, Calif.
ANALYTICAL STUDIES ON ION PROPULSION, by R. H. Boden. Rept. for July-Dec 59 on Contract AF 49(638)649. Aug 60, 77p. 30 refs. ARL Technical rept. 60-279.
Order from OTS $2.00 PB 171 305

Analyses of major problems associated with components of the ion rocket engine system have been made. Component studies include electrical power generation systems, thermal power conversion, and accelerating electrode configurations. Analyses of ion beam dynamics, propellant materials, radiation damage to working fluid for a nuclear power plant, and missions using low-thrust vehicles are presented. Interpretation of these analyses is made in terms of engine design parameters. (Author)

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
EXPERIMENTAL PERFORMANCE OF A PULSED GAS ENTRY COAXIAL PLASMA ACCELERATOR AND APPLICATIONS TO SPACE MISSIONS, by B. Gorowitz and P. Gloersen. Rept. on Contract AF 04(647)269. Oct 60, 23p. 4 refs. Technical Information Series R60SD456; AD-245 788.
Order from LC mi$2.70, ph$4.80 PB 152 959

The performance of a pulsed gas entry coaxial type plasma accelerator has been evaluated by several experimental techniques. Impulse, kinetic energy, specific impulse, mass flow, and propellant species were investigated for single pulse operation of the accelerator fired into an oversize test chamber pumped down to a pressure of 10^{-6} mm of Hg. Kerr Cell photography of the luminous plasma exhaust indicated a high ratio of unidirectional kinetic energy to thermal energy in the plasma exhaust as demonstrated by the small amount of lateral spreading of the plasma in the oversize test chamber. With 4500 joules stored in the capacitor bank, the performance of the accelerator is as follows: The calorimeter measurements indicate that at least 25% of the energy originally stored in the capacitor appears as unidirectional kinetic energy in the plasma exhaust (1125 joules). The impulse delivered to the ballistic pendulum under these conditions was 3950 dyne-seconds The time-of-flight measurements indicate an average specific impulse of 6000 seconds, in agreement with the specific impulse deduced from the impulse and kinetic energy measurements. Rotating mirror camera records show that initial portions of the plasma emanate at a specific impulse of 30,000 seconds but that subsequent portions emanate at a specific impulse of 6000 seconds.

Sundstrand Turbo Div., Sundstrand Corp., Pacoima, Calif.
STUDY OF TURBINE AND TURBOPUMP DESIGN PARAMETERS. VOLUME I. A STUDY OF HIGH PRESSURE RATIO RE-ENTRY TURBINES, by Hans D. Linhardt. Rept. for 1 Feb 58-30 Jan 60 on Contract Nonr-2292(00). 30 Jan 60, 154p. 18 refs. S/TD No. 1735; AD-232 635.
Order from LC mi$7.50, ph$24.30 PB 152 856-1

The design point analysis of two-stage, axial re-entry type turbines is presented for the case of low weight flow and high over-all pressure ratios. The optimum pressure split between both stages is investigated approximately by evaluating the optimum performance for two-stage re-entry turbines with equal heads or equal pressure ratios in both stages. The optimum efficiency for both pressure splits is analyzed and a theoretical method of determining the detailed design criteria is presented for each optimum design. The method of analysis is substantiated by test of a two-stage re-entry turbine designed according to the analysis. Deviations from this analysis were found to be caused by increased leakage and off-design performance of the second-stage nozzle. (Author) (See also PB 150 834)

Sundstrand Turbo Div., Sundstrand Corp., Pacoima, Calif.
STUDY OF TURBINE AND TURBOPUMP DESIGN PARAMETERS. VOLUME II. A STUDY OF HIGH PRESSURE DRAG TURBINES USING COMPRESSIBLE FLUIDS, by Robert Spies. Final rept. for 1 Feb 58-30 Jan 60 on Contract Nonr-2292(00). 30 Jan 60, 61p. 4 refs. S/TD No. 1735; AD-232 636.
Order from LC mi$3.90, ph$10.80 PB 152 856-2

The simplified drag-turbine theory presented by Balje (Trans. ASME, Aug 57, p. 1291) has been extended to cover the case of a compressible gas in a turbine of arbitrary area distribution. Conclusions regarding superior performance when an expanding channel is used have been verified and areas of future investiga-

tions indicated. The attainable efficiency of a large pressure-ratio drag-turbine is high with values of 44 percent anticipated in future designs. (Author) (See also PB 152 856-1)

Sundstrand Turbo Div., Sundstrand Corp., Pacoima, Calif.
STUDY OF TURBINE AND TURBOPUMP DESIGN PARAMETERS. VOLUME III. LOW SPECIFIC SPEED TURBINES BASED ON TANGENTIAL FLOW THEORY, by Michael Dubey. Final rept. for 1 Feb 58-30 Jan 60, on Contract Nonr-2292(00). 30 Jan 60, 108p. 7 refs. S/TD No. 1735; AD-232 637.
Order from LC mi$5.70, ph$16.80 PB 152 856-3

The tangential flow theory for drag turbines, as proposed by D. H. Silvern, stipulates that a recirculating flow mechanism for harnessing the energies available in a working fluid can be expressed by Euler's equations, with minor corrections for friction forces. The significant equations of Silvern's theory are used to design a test turbine which successfully demonstrates that the desired flow pattern can be established. The corresponding high efficiencies predicted by the analysis are also attained. These turbine efficiencies are considerably higher than that possible for single stage axial flow, terry, or drag turbines operating at the same very low specific speeds. By using the loss coefficients inferred by the test data, an $N_S D_S$ diagram is derived indicating the maximum efficiencies attainable with optimized design parameters. The effects of geometry ratios on performance are also discussed. (Author) (See also PB 152 856-2)

Manufacturing Equipment and Processes

Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio.
REVIEW OF SOME UNCONVENTIONAL METHODS OF MACHINING, by Francis W. Boulger. [Rept. on Contract AF 18(600)1375]. 29 Nov 60, 20p. 60 refs. DMIC memo. 75.
Order from OTS $0.50 PB 161 225

The portion of a review covering the principles and applications of four electrical machining techniques, as well as some information on chemical and ultrasonic methods, is presented in this memorandum as an aid to defense contractors in planning manufacturing operations.

Microwave Research Inst., Polytechnic Inst., Brooklyn, N. Y.
DIES FOR FORMING FERRITE PARTS, by H. Hanft and L. Silber. Rept. on Contract AF 30(602)2135. 19 July 60, 9p. 1 ref. Research rept. PIBMRI-831-60; RADC-TN-60-199; AD-245 072.
Order from LC mi$1.80, ph$1.80 PB 152 724

A method for making dies for compression molding of ferrites is described. This technique lends itself to shapes such as those with rectangular holes, which cannot be readily machined. (Author)

Naval Ordnance Test Station [China Lake] Calif.
NICKEL ELECTROFORMING OF OPTICAL MIRRORS, by R. A. Weinhardt. Interim rept. 2 Feb 53, declassified 24 June 55. 17p. 10 refs. Technical memo. 786.
Order from LC mi$2.40, ph$3.30 PB 153 883

This report released for sale to the public 19 Jan 61.

The general technique of electroforming is relatively simple, consisting of plating a heavy deposit of metal onto or into a suitable mandrel, and separating the plated metal from the mandrel. The metal thus becomes the part desired, which may or may not require subsequent machining. The process lends itself to the production of parts having complex surfaces which would be difficult or even impossible to produce by other methods. In addition, it has the capability of reproducing the surface finish of the mandrel to very great accuracy. This feature makes possible the production of metal mirrors.

Transport, Traction and Hoist Facilities

Arctic Aeromedical Lab., Ladd AFB, Alaska.
FIELD TEST OF CANADIAN SNOWMOBILE, by Jack C. Green. Aug 49, 7p. Proj. no. 21-01-024.
Order from LC mi$1.80, ph$1.80 PB 153 320

The purpose was to test the adequacy of the Canadian Snowmobile (Mark II, Penguin) as a crash-rescue vehicle under subarctic winter temperatures and terrain conditions.

Naval Civil Engineering Lab., Port Hueneme, Calif.
COMBINATION CARGO SLEDS, Y-F015-11-235, TYPE C, by J. J. Doman and D. Taylor. Final rept. 26 Oct 60, 20p. Technical rept. 091; AD-246 000.
Order from LC mi$2.40, ph$3.30 PB 152 942

A combination sled has been developed for arctic use which can be readily converted from a bobsled for long-haul sled train operations to two fixed-runner sleds for short-haul operations. (Author)

Naval Civil Engineering Lab., Port Hueneme, Calif.
THE TUNDRA TRUCK, Y-F015-99-001, TYPE C, by D. Taylor. Final rept. 30 Sep 60, 40p. 6 refs. Technical rept. 094.
Order from LC mi$3.00, ph$6.30 PB 152 940

The Laboratory designed and tested a self-propelled cargo vehicle combining amphibious and low-ground-pressure capabilities for snow and swamp operations in the arctic. The vehicle maneuvered easily in water but failed on land. (Author)

MATERIALS

Fabric Research Labs., Inc., Dedham, Mass.
INVESTIGATION OF THE HIGH SPEED IMPACT BEHAVIOR OF FIBROUS MATERIALS. PART I: DESIGN AND APPARATUS, by Chauncey C. Chu, Robert

J. Coskren, and Henry M. Morgan. Rept. for 15 Feb 59-15 June 60 on Air Force Textile Materials, Contract AF 33(616)6321. Sep 60, 39p. 2 refs. WADD Technical rept. 60-511, Part I.
Order from OTS $1.00 PB 171 311

A high speed impact test machine has been designed, constructed, and calibrated to test parachute components at high rates of loading. This instrument is capable of rupturing materials of up to 10,000 pounds static breaking strength at velocities of from 200 to 750 feet per second. The impacting force is applied by a free flying missile launched by a gas gun utilizing either nitrogen or helium gas at moderately low pressures. The gun has a bore of 2.5 inches and fires missiles weighing up to 10 pounds. Pertinent data are obtained by means of multiple exposure photography using a multimicroflash lighting source which provides a maximum of fifteen separate flashes spaced at predetermined intervals of between 10 and 10,000 microseconds. The resulting photograph records the specimen and the impacting missile before, during and after the impact. Measurement of the distances between successive exposure yields information such as the breaking strength, the extension to rupture, and the energy absorbed by the specimen. (Author)

Material Labs., Puget Sound Naval Shipyard, Bremerton, Wash.
REINFORCED PLASTIC COATINGS FOR THE PROTECTION OF METAL SURFACES, by L. N. Schultz and M. E. Phelps. Jan 60, 27p. 7 refs. Interim rept. P-300-10.
Order from LC mi$2.70, ph$4.80 PB 152 862

Antifouling paints applied over plastic coated steel panels have been exposed for three years to full and part time saltwater immersion. The effect of this exposure on several resins with various surface treatments is described. (Author)

Rock Island Arsenal Lab., Ill.
HEAT FUSED CERAMIC COATINGS FOR ALUMINUM COMPONENTS OF ROCKET LAUNCHERS, by T. Rice and T. Turner. 21 Oct 60, 19p. 4 refs. Rept. no. 60-3203.
Order from OTS $0.50 PB 171 047

Ceramic coatings containing lead-bearing and lead-free frits have been prepared from commercially available frits, addition agents, and pigments and applied to aluminum test panels. The coatings have excellent heat resistance, but are deficient in abrasion resistance. No appreciable differences were noted between the lead-bearing and the lead-free formulations. (Author)

Washington U., Seattle.
CHEMICAL PHYSICS RELATED TO PHOTOGRAPHY, by William T. Simpson. Rept. on Contract AF 18(600)375. Mar 60, 138p. 225 refs. AFOSR-TR-60-43.
Order from LC mi$6.90, ph$21.30 PB 152 446

Summary of work on the interweaving of quantum chemistry and experimental electronic state spectroscopy.

Included in the report are:
Structures and π-electron spectra. III. Triphenylmethane dyes, pub. in the Jnl. of the American Chemical Society 76:6293-6300, 1954
The unit-cell dimensions and space group of 1, 1'-diethyl-2, 2'-pyridocyanine iodine, pub. in Acta Crystallographica 8:119, Feb 55.
Low resolution electronic spectrum of hexamethylbenzene with application to benzene, pub. in the Jnl. of Chemical Physics 23:1146-1151, June 55
Low resolution electronic spectrum of crystalline para-dimethoxybenzene with application to benzene, pub. in the Jnl. of Chemical Physics 23:1480-1485, Aug 55
Polarization of the 1850 Å. band of amides, pub. in the Jnl. of the American Chemical Society 77:3929, 1955
Spectroscopic study of Wurster's blue and tetramethyl-*p*-phenylenediamine with assignments of electronic transitions, pub. in the Jnl. of the American Chemical Society 77:4454, 4461, 1955
Resonance force theory of carotenoid pigments, pub. in the Jnl. of the American Chemical Society 77:6164, 6168, 1955
Classification of π-electron states, pub. in the Jnl. of the American Chemical Society 78:3585, 3590, 1956
Calculation of bond eigenfunction matrix elements with the vector model, pub. in the Jnl. of Chemical Physics 25:1297-1298, Dec 56
Coupling strength for resonance force transfer of electronic energy in Van der Waals solids, pub. in the Jnl. of Chemical Physics 3:588-593, Mar 57
Polarized electronic absorption spectrum of amides with assignments of transitions, pub. in the American Chemical Society 79:2375-2382, 1957
Theoretical electronic spectrum of the allyl system, pub. in the Jnl. of Chemical Physics 27:20-23, July 57
Electronic spectra of pyridocyanine dyes with assignments of transitions, pub. in the Jnl. of the American Chemical Society 79:4314-4320, 1957
Application of the Pariser and Parr method to dye ions with amidinium resonance, pub. in the Jnl. of Chemical Physics 28:297-300, Feb 58
Consolidated variation perturbation theory, pub. in the Jnl. of Chemical Physics 28:925-928, May 58
Formal Hückel theory, pub. in the Jnl. of Chemical Physics 28:972-974, May 58
Electronic spectrum of 4, 4'-bis-dimethylamino fuchsone and related triphenylmethane dyes, pub. in Molecular Spectroscopy 3:363-380, Aug 59
Hückel theory: An effective Hamiltonian, pub. in the Jnl. of Chemical Physics 31:1317-1319, Nov 59
Evaluation of one-center electron repulsion integrals between certain *s*-type atomic orbitals, pub. in the Jnl. of Chemical Physics 32:124-126, Jan 60
Metallic reflection from molecular crystals, pub. in Reviews of Modern Physics 32:466-476, Apr 60
Calculation of delocalization contribution to infrared intensity, pub. in the Jnl. of Chemical Physics 32:1747-1756, June 60

Fuels, Lubricants, and Hydraulic Fluids

Combustion and Explosives Research, Inc., Pittsburgh, Pa.
THE THERMODYNAMICS OF PROPELLANT GASES, by Stuart R. Brinkley, Jr. Final rept., pt. 1 on Contract DA 36-061-ORD-425. 30 Sep 56, 36p. 18 refs. AD-157 442.
Order from LC mi$3.00, ph$6.30 PB 149 665

In Part I methods for the calculations are developed. In Part II an explicit program for these methods is presented for the ORDVAC, a high speed computed located at the Ballistic Research Laboratories, Aberdeen, Maryland.

Consolidated Electrodynamics Corp., Pasadena, Calif.
AN ANALYZER FOR MOISTURE AND SOLIDS IN JET FUELS, by Michael Czuha, Jr. and Kenneth W. Gardiner. Rept. for June 59-May 60 on Aviation Fuels, Contract AF 33(616)6588. Sep 60, 34p. 7 refs. WADD Technical rept. 60-461.
Order from OTS $1.00 PB 171 303

A continuous analyzer for water in turbine fuels was developed based on the absolute coulometric decomposition of the water. An optical method for determining suspended solids using forward scattering of light was also developed. The unitized instrument operates in the parts per million range on both types of fuel contaminants. (Author)

Fuels Research Lab., Mass. Inst. of Tech., Cambridge.
EXPERIMENTAL STUDIES OF SUB-ATMOSPHERIC COMBUSTION, by H. C. Hottel, G. C. Williams and others. Rept. for 1 June 58-31 May 59 on Research to Verify the Model Laws Related to Combustion at Low Pressure, Contract AF 33(616)5746. Aug 60, 65p. 30 refs. ARL Technical rept. 60-296.
Order from OTS $1.75 PB 171 306

Geometrically similar ramjet-type combustion chambers of 1.61-, 4.026-, and 6.065-inch diameter and lengths of 5.25D and 4.25D were operated at Reynolds numbers ranging from 24,000 to 230,000 and pressure levels from 0.2 to 1.5 atmospheres with propane fuel. Burner stability limits were satisfactorily correlated by the parameter U_{BO}/PD as a function of air/fuel ratio. Combustion efficiency was determined from oxygen consumption and was shown to be essentially the same for scaled burners if the Reynolds number and Damkohler's chemical parameter, $U/P^{n-1}D$, were held constant; the pressure exponent, n, showed some variation around an average value of 2. Deficiencies in the scheme of modeling based on the two parameters above are discussed. It is shown that wall heat losses, an effect of pressure on turbulence level, and unscalable oscillatory phenomena all tend to produce unscaled effects on burner stability and efficiency. In particular, inclusion of the two conventional parameters alone and omission of the scaling of wall heat losses can lead to efficiencies determined on the "model" which are significantly different from those of the prototype. (Author)

National Research Labs., Ottawa (Canada).
LUBRICANT BEHAVIOUR IN CONCENTRATED CONTACT. THE EFFECT OF TEMPERATURE, by F. W. Smith. Aug 60, 33p. 13 refs. Mechanical Engineering rept. MP-17.
Order from LC mi$3.00, ph$6.30 PB 153 476

Experiments are described on the frictional behaviour of a petroleum oil in the contact zone between a steel roller and an aluminum one at 23°C and between steel rollers and between tungsten carbide rollers at 23°C, 100°C and 190°C. The coefficient of sliding friction decreases with increasing temperature. Qualitatively, this is taken to indicate that the frictional force represents the shearing of a thick plastic film of lubricant; quantitative agreement between experiments with steel and with carbide rollers is poor. To explain disaccord with other experiments in which the coefficient of friction increases with increasing temperature, it is proposed that mechanical instability of the lubricant film may be a factor in extreme pressure lubrication. On general physico-chemical grounds, it is suggested that an intermolecular sliding process occurs at a shear plane in typical concentrated contact lubricant films at low temperature and high stresses. The relationship between such shear-plane processes and the Ree-Eyring theory of non-Newtonian viscosity is discussed. (Author)

Naval Ordnance Test Station, China Lake, Calif.
THE PREDICTION OF THE CRITICAL TEMPERATURE OF PROPELLANT GRAINS, by Frank H. Conrad and Paul A. Longwell. 4 Sep 60, 30p. 7 refs. NOTS TP 2517; NAVWEPS rept. 7096. AD-245 485.
Order from LC mi$2.70, ph$4.80 PB 152 825

The critical temperature of a propellant grain may be defined as that temperature imposed by the surroundings in some specified fashion above which the grain will eventually explode or destroy itself due to "self heating" or spontaneous combustion. The critical temperature is a function of the thermal constants and dimensions of the propellant grain and of the heat transfer coefficients between the grain and the surroundings. For a given propellant, the critical temperature is decreased by increasing the size of the grain and by decreasing the heat transfer coefficient to the surroundings. This report presents the information available concerning the calculation of critical temperatures for hollow cylinders in a fashion such that engineers working with propellants can easily make use of this information. For this work to be most useful on new propellants, experimental values of the heat generation coefficient, Q, and the activation energy, E, should be obtained for these propellants. (Author)

Plastics

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
PROBLEMS OF WAVE PROPAGATION IN PLASTIC MEDIA, by Julian L. Davis. Nov 60, 34p. 7 refs. Technical rept. FRL-TR-12.
Order from LC mi$3.00, ph$6.30 PB 150 013

Some current investigations concerning the behavior of plastic and viscoelastic media subjected to externally applied dynamic loads are discussed, with emphasis on the analysis of a problem concerning wave propagation in a bounded viscoelastic medium. A brief survey of some current problems in nonlinear wave propagation is given. This work is part of a program of basic research on the physical and chemical properties of polymeric materials being carried out in the Plastics and Packaging Laboratory at Picatinny Arsenal. (Author)

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
SEPARATION AND SOLUTION PROPERTIES OF GRAFT COPOLYMERS OF P-ISOPROPYLSTYRENE AND METHYL METHACRYLATE, by David W. Levi. Oct 60, 24p. 16 refs. Technical rept. FRL-TR-13.
Order from LC mi$2.70, ph$4.80 PB 149 963

Evidence for grafting of poly(methyl methacrylate) to autoxidized poly(p-isopropylstyrene) obtained earlier from solubility and fractionation behavior is summarized. An extraction method was developed for separating the graft copolymer from the admixed homopolymer. Preliminary dilute solution characterization of the separated graft copolymer samples by light scattering and viscosity was carried out. When compared with the homopolymers, the molecular weight-viscosity relation and second virial coefficients furnish excellent evidence that grafting was indeed accomplished. However, the dimensions of the graft copolymers from light scattering were anomalous. (Author)

Naval Research Lab., Washington, D. C.
THE EFFECT OF DIFFERENTIAL TEMPERATURES ON THE FRACTURE TOUGHNESS OF STRETCH-ORIENTED POLYMETHYL METHACRYLATE, by H. L. Smith, W. E. Anderson, and E. O. Cook. Interim rept. 1 Nov 60, 14p. 7 refs. NRL rept. 5547.
Order from LC mi$2.40, ph$3.30 PB 149 850

Stretch-oriented polymethyl methacrylate (Plexiglas) is known to have superior fracture toughness over as-cast material within certain temperature boundaries. It loses toughness when held at temperatures above the glass transition temperature (approximately 200°F to 225°F), and its superiority over as-cast material is lost when fractured at temperatures of approximately 20°F or lower, depending on the particular composition of material. The fracture toughness advantage of stretch-oriented material over as-cast material for transparent aircraft enclosures is then limited to temperatures above the brittle transition temperature, and the plane is limited to speeds below that for which aerodynamic heating results in excessive skin temperatures. The data show that stretch-oriented polymethyl methacrylate may be used for finite periods of time at aircraft speeds resulting in skin temperatures somewhat above the glass transition temperature, provided that such skin temperatures are coupled with downward temperature differences in the thickness direction of the material. Stretch-oriented material is also shown to retain a two-to-one margin in toughness over as-cast material at skin temperatures down to 0°F when coupled with upward temperature differences in the thickness direction of the material. (Author)

Plastics Technical Evaluation Center, Picatinny Arsenal, Dover, N. J.
RECENT DEVELOPMENTS IN CASTING RESINS AND TECHNOLOGY FOR ELECTRICAL ENCAPSULATION APPLICATIONS, by Arnold M. Molzon. Nov 60, 34p. 90 refs. PLASTEC rept. 3.
Order from OTS $1.00 PB 171 034

Recent developments in plastic casting resins, processing techniques, and test methods for electrical encapsulation applications are summarized. Plastic materials covered include epoxy, silicone, polysulfide, polyurethane, polyester, and hydrocarbon. Advances in electrical testing techniques have been largely due to the use of sensing devices encapsulated in the resin and the determination of parameters both during and after resin hardening. Instrumentation has been reported for determining the existence and magnitude of thermal stresses in casting resins during and after cure; thermodynamic properties, such as rate of polymerization, extent of polymerization, and over-all activation energies; and thermal properties, such as specific heat and second-order transition temperature. Advances in encapsulation techniques have been made in mixing and dispensing equipment, expendable molds, and kit-type packaging. The report lists resin suppliers, suppliers of formulated material, and chemical structure of encapsulating resins and diluents. (Author)

Thiokol Chemical Corp., Elkton, Md.
DEVELOPMENT OF TE-60 PLASTIC PARTS ASSEMBLY, by H. G. Jones. Final rept. for 29 Aug 55-31 Mar 59 on Contract AF 33(600)31113. 24 Dec 59, declassified. 173p. 35 refs. Rept. no. E120-59.
Order from LC mi$8.10, ph$27.30 PB 153 620

This report released for sale to the public 10 Jan 61.

A program was conducted which demonstrated the feasibility of constructing chambers and nozzles for solid propellant motors from reinforced plastic materials. The T-61 (Matador) booster was selected for this program. A successful reinforced nozzle and chamber assembly was made of fiber glass roving and epoxy resin. This assembly weighed less than 600 lbs and when loaded contained 1,450 lbs of T-35 (polysulfide) propellant. The performance of this motor was approximately 106,000 lbs of thrust for 2.6 seconds at 60°F. Six firings were made; all were successful. The firings were made at -30°, 60° and 160°F and included a drop test, a rough road test, and a temperature cycle test. (Author)

Rubber and Elastomers

Institute of Rubber Research, U. of Akron, Ohio
STRESS RELAXATION AND STRUCTURE OF HIGH TEMPERATURE ELASTOMERS, by Maurice Morton, V. R. Allen, and R. D. Gates. Technical rept no. 7, 1 Dec 59-29 Feb 60, on Contract Nonr-2573(00). [1960] 38p. 11 refs. AD-235 312.
Order from LC mi$3.00, ph$6.30 PB 153 172

Sol-gel relations have been determined for the degradation of sulfur vulcanizates of natural rubber by selective reduction of the sulfur crosslinks. The shapes of these curves have been interpreted in terms of network chain entanglements and crosslink density. Experimental results add credence to the conclusions that natural rubber vulcanizates degrade oxidatively via random scission of network chains. Sol-gel relations during network formation have been used to calculate the molecular weight between entanglements for uncrosslinked natural rubber. The observed differences in the reported values of this parameter have been attributed to a variable term which relates the effectiveness of the

entanglement to chain flexibility. The determination of μ (the polymer solvent interaction coefficient) for the Vitron A-methyl ethyl ketone system by vapor pressure measurements gave a negative value for v_2 greater than 0.135. Degradation studies of Viton A have shown that crosslinking accompanies degradation when the elastomer is exposed to high temperatures 275°C.). A post-cure heat treatment (15-24 hours at 200°C.) retards the rate of degradation of the vulcanizate during subsequent heat aging tests. (Author)

Rock Island Arsenal Lab., Ill.
ANTIRADS FOR NITRILE RUBBER, by J. W. McGarvey 22 Sep 60, 28p. 22 refs. Rept. no. 60-2856.
Order from LC mi$2.70, ph$4.80 PB 150 961

The mechanisms of radiation damage and protection in organic materials were investigated and a total of 118 different nitrile vulcanizates containing potential antirads were evaluated in a screening program. Several antirads were found which imparted a significant degree of protection to nitrile rubber exposed to cobalt 60, gamma radiation. A good antirad such as 1,1'-diphenyl-2-picrylhydrazine imparted approximately the same degree of radiation resistance to nitrile rubber a is inherent in natural rubber. This investigation also demonstrated the existance of certain structural correlations by which it may be possible to select or synthesize new and even more efficient antirads. (Author)

Rock Island Arsenal Lab., Ill.
INTERNAL AND SURFACE TEMPERATURES OF RUBBER EXPOSED TO DIRECT SUNLIGHT, by E. W. Bergstrom. 31 Aug 60, 11p. Rept. no. 60-2561.
Order from OTS $0.50 PB 171 042

Surface and internal temperatures were measured on rubber (SBR) discs which were exposed outdoors to direct sunlight during the hot summer weather at Rock Island Arsenal. It was found that the surface and internal temperatures of the rubber were in the range of 35 to 50°F. higher than the surrounding air temperatures. This information should be of value in establishing specification requirements for rubber items which will be exposed outdoors in temperate climates. (Author)

Rock Island Arsenal Lab., Ill.
OZONE RESISTANCE OF SBR VULCANIZATES, by E. W. Bergstrom. 31 Aug 60, 34p. 23 refs. Rept. no. 60-2563.
Order from OTS $1.00 PB 171 043

This report summarizes the results of various investigations pertaining to the ozone resistance of SBR vulcanizates. Results are reported for studies on, (1) long term outdoor exposure tests, (2) the correlation of accelerated ozone test results with outdoor test results, (3) the ozone resistance of SBR vulcanizates under dynamic test conditions, (4) the protection of SBR vulcanizates exposed under constant load conditions, (5) the protection of oil extended SBR from ozone attack, (6) the protection of vulcanizates containing a 60/40 ratio of SBR/natural rubber, (7) the compatibility of N,N'-di-3(5 methyl heptyl)-p-phenylenediamine with various nonelemental sulfur curing systems, and (8) the staining characteristics of p-phenylenediamine antiozonants. (Author)

MATHEMATICS

Applied Mathematics and Statistics Labs., Stanford U., Calif.
ASYMPTOTIC STOPPING REGIONS FOR SEQUENTIAL TESTING WITH AN INDIFFERENCE REGION, by Gideon Schwarz. Technical rept. no. 54 on Contract N6onr-25140. 19 Jan 60, 13p. 1 ref. AD-231 229.
Order from LC mi$2.40, ph$3.30 PB 152 883

A family of tests is defined by a property that could be used in the 2-hypotheses problem to characterize the Wald test: For every test in the family, the a posteriori risk due to stopping and taking the more favorable action is a constant r along the boundaries of the stopping region. The regions in the (n, S_n) - plane are shown to grow, as $r \to 0$, in all directions like - log r. The asymptotic shape of the regions is found explicitly for this case and for a generalization to composite hypotheses. This generalization essentially covers the case where there are 2 hypotheses separated by a true indifference zone so that if the mean lies in the indifference zone there is no loss attached to either terminal decision. The asymptotic shapes are shown to be valid for a whole class of r-families of tests. (Author)

Army Signal Research and Development Lab., Fort Monmouth, N. J.
A CLASS OF TYPICALLY-REAL MEROMORPHIC FUNCTIONS, by R. K. Brown. 1 June 60, 18p. 7 refs. USASRDL Technical rept. 2121; AD-242 517.
Order from LC mi$2.40, ph$3.30 PB 152 674

A Stieltjes-integral representation for a class of functions which are typically-real and meromorphic in the unit circle is developed. With this representation, new and more direct proofs are obtained for several theorems due to A. W. Goodman (Trans. Am. Math. Soc. 81:92-105, 1956). New bounds for the coefficient differences are established, and domains of variability are derived for the derivatives of the functions. (Author)

Army Signal Research and Development Lab., Fort Monmouth, N. J.
TWO THEOREMS ON PATHOLOGICAL EXTENSIONS OF DIFFERENCE FIELDS, by Albert E. Babbitt. 9 Aug 60, 9p. 5 refs. USASRDL Technical rept. 2145; AD-242 982.
Order from LC mi$1.80, ph$1.80 PB 152 675

A difference field extension of a difference field F which either is incompatible with some other extension of F or is a monadic extension of F is said to be a pathological extension of F. It is known that a difference field admits a finitely generated pathological extension only if it admits a pathological extension of the same type of order zero. In this paper the following generalization is proved: Let G be an extension of F of transformal transcendence degree at least 1 over F. Then G admits a finitely generated pathological extension only if there exists an element a in G such that a generates a pathological extension of F of order zero. (Author)

Behavioral Sciences Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
DISTRIBUTION-FREE STATISTICAL TESTS, by James V. Bradley. Aug 60, 387p. 19 refs. WADD Technical rept. 60-661.
Order from OTS $5.00 PB 171 312

As a result of an extensive survey of the literature, a large number of distribution-free statistical tests are examined. Tests are grouped together primarily according to general type of mathematical derivation or type of statistical information used in conducting the test. Each of the more important tests is treated under the headings: Rationale, Null Hypothesis, Assumptions, Treatment of Ties, Efficiency, Application, Discussion, Tables, and Sources. Derivations are given and mathematical interrelationships among the tests are indicated. Strengths and weaknesses of individual tests, and of distribution-free tests as a class compared to parametric tests are discussed. (Author)

California U., Berkeley.
ASYMPTOTIC BEHAVIOR AND UNIQUENESS THEOREMS FOR HYPERBOLIC EQUATIONS AND INEQUALITIES, by M. H. Protter. Technical rept. no. 9 on Contract AF 49(638)398. Mar 60, 20p. 6 refs. AFOSR-TN-60-300; AD-235 217.
Order from LC mi$2.40, ph$3.30 PB 149 646

Inequalities of the form $|Lu| \leq c_1 |u| + c_2 \sum_{i=1}^{n} \left|\frac{\partial u}{\partial x_i}\right| + c_3 \left|\frac{\partial u}{\partial t}\right|$ are considered, where $L = A - \frac{\partial 2}{\partial t^2}$ and A is an elliptical operator.

California U., Berkeley.
HOMOTOPY-ABELIAN LIE GROUPS, by S. Araki, I. M. James, and Emery Thomas. Technical rept. no. 13 on Contract AF 49(638)79. June 60, 7p. 8 refs. AFOSR-TN-60-487; AD-244 906.
Order from LC mi$1.80, ph$1.80 PB 152 606

A topological group G is said to be homotopy-abelian if the commutator map of G x G into G is nulhomotopic. The following theorem is proved: a compact connected Lie group is homotopy-abelian only if it is abelian. (Author)

California U., Berkeley.
LIE ALGEBRA COHOMOLOGY AND THE GENERALIZED BOREL-WEIL THEOREM, by Bertram Kostant. Technical rept. no. 16 on Contract AF 49(638)79. Sep Sep 60, 108p. 8 refs. AFOSR TN-60-1061; AD-244 907.
Order from LC mi$5.70, ph$16.80 PB 152 607

Contents:
Cochain complexes defined by Lie algebras and Hermitian structures
The Laplacian in the case of a Lie summand
The spectral resolution of the Laplacian and cohomology for a family of nilpotent Lie summands
The generalized Borel-Weil Theorem
Weyl's character formula and its extension to non-connected groups
Symmetric complex spaces X and a generalization of a theorem of Ehresmann

California U., Berkeley.
ON DIFFERENCE METHODS FOR THE SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS OF MIXED TYPE, by Hajimu Ogawa. Technical rept. no. 11 on Contract AF 49(638)398. Oct 60, 51p. AFOSR-TN-60-1026; AD-245 313.
Order from LC mi$3.60, ph$9.30 PB 152 715-1

This paper is concerned with the problem of solving boundary and initial value problems for certain partial differential equations of mixed type by finite difference methods. Filippov, in considering the Tricomi equation, used a maximum principle as a basis for proving the existence of the solution to a certain difference equation. This solution was shown to converge, as the mesh size tends to zero, to the solution to the boundary value problem for the Tricomi equation, provided that the latter exists and is sufficiently smooth. In the first part of this paper, Filippov's results are extended to a more general mixed-type equation whose difference approximation has a solution which satisfies a maximum principle. It is found that the conditions under which the solution of the differential equation satisfies a maximum principle, as discovered by Agmon, Nirenberg and Protter, are sufficient for the solution of the difference equation to satisfy an analogous principle, except near the parabolic line where additional conditions are required. (Author)

California U., Berkeley.
ON DIFFERENCE METHODS FOR THE SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS OF MIXED TYPE, by Hajimu Ogawa. Technical rept. no. 11, Part 2 on Contract AF 49(638)398. Oct 60, 54p. 9 refs. AFOSR-TN-60-1026, pt. 2; AD-245 313, pt. 2.
Order from LC mi$3.60, ph$9.30 PB 152 715-2

Finite difference methods are employed for the solution of an equation which is hyperbolic in the interior of a domain and parabolic on the line which carries the initial data. As in the boundary value problem, a maximum principle for a suitable difference equation yields an approximate solution which converges to the solution of the differential equation as the mesh size tends to zero. Again it is found that the conditions under which the differential equation has the maximum property, as found by Weinberger and Protter, imply that the difference equation has the property, except near the parabolic line. An existence theorem for the solution to the boundary value problem for an equation which is hyperbolic in the interior of a domain and parabolic on a part of the curve carrying the boundary values is proved. (See also PB 152 715-1)

Carnegie Inst. of Tech., Pittsburgh, Pa.
SOME RESULTS ON TRANSFORMATIONS IN THE ANALYSIS OF VARIANCE, by M. M. Rao. Rept. on Mathematical Techniques of Aeromechanics, Contract AF 33(616)3878. Aug 60, 24p. 13 refs. ARL Technical note 60-126.
Order from OTS $0.75 PB 171 334

The square-root and the logarithmic transformations are considered when the mean is large in each case. In the former the variance is assumed known, and in the latter the corresponding assumption is that the coefficient of variation is small but the variance is unknown.

In these cases, it is shown that the usual normal theory is applicable to test the hypotheses on means of the untransformed variables. Sufficient conditions for the applicability of the normal theory are presented for a class of distributions depending on a finite set of parameters with one parameter large, while the others, if any, are relatively small, or are confined to a fixed bounded set in the parameter space. (Author)

Columbia U. School of Engineering, New York.
THE LOSS OF INFORMATION DUE TO THE GROUPING OF DATA, by Peter Frank. Technical rept. no. 6 on Contract Nonr-266(55). 6 Jan 60, 25p. 3 refs. AD-231 843.
Order from LC mi$2.70, ph$4.80 PB 152 896

Much of the theory of estimation is based on continuous distributions where it is assumed that observations are real numbers: that is, they can be made with infinite accuracy; this is a convenient mathematical approximation. In the actual world, two observations which fall in the same interval (of real numbers) are identified: the observations have been grouped. The size of the groupings has an effect of the efficacy of the statistical procedures; also, the groupings can be made part of a statistical design. In this report, size of groupings is analyzed by using Fisher's definition of information.

Electronics Research Lab., U. of California, Berkeley.
MONTE CARLO ESTIMATES OF EXCURSION PROBABILITIES OF A GAUSSIAN PROCESS, by M. B. Freeman. Rept. on Contract Nonr-222(53). 30 Mar 60, 32p. 20 refs. IER series no. 60, issue no. 272; AD-238 740.
Order from LC mi$3.00, ph$6.30 PB 148 500

The probability that a certain Gaussian random process is greater than b throughout a time interval of length t seconds is estimated from observations of a high-speed numerical model. The process is that characteristic of a simple harmonic oscillator in Brownian motion. (Author)

Harvard U. [Cambridge, Mass.]
BEST APPROXIMATORS WITHIN A LINEAR FAMILY ON AN INTERVAL, by J. L. Walsh and T. S. Motzkin. Rept. on Contract AF 49(638)574. July 60, 19p. 8 refs. AFOSR TN-60-911; AD-244 395.
Order from LC mi$2.40, ph$3.30 PB 152 375

The purpose of the present note is to investigate the behavior of functions p(x) of best approximation to a given function f(x), where p(x) is supposed to belong to a linear family P and where deviation is measured on E: $0 \leq x \leq 1$ by a generalized norm

$$\|f(x) - p(x)\| = \int_E \tau(|f(x)-p(x)|)w(x)dx$$

involving a transformer $\tau(t)$ and a weight function w(x). This norm was recently studied in the special case $\tau(t) \equiv t^p$, $p > 0$, $w(x) \equiv 1$, and is now to be studied more generally (but not including the case $p < 1$).

Harvard U. [Cambridge, Mass.]
ON THE CIRCLES OF CURVATURE OF THE CURVES OF STEEPEST DESCENT OF GREEN'S FUNCTION, by J. L. Walsh. Rept. on Contract AF 49(638)574. Oct 60, 17p. 2 refs. AFOSR TN-60-1138; AD-244 397.
Order from LC mi$2.40, ph$3.30 PB 152 369

A number of years ago the present writer published a study of the tangents and circles of curvature of lemniscates and of the level loci of Green's function in the plane. The present note is complementary to that previous study, and considers elementary geometric properties of the curves of steepest descent, namely the lines of force, or orthogonal trajectories of the level loci of Green's function. The method used is a continuation of the previous methods, especially, use of an integral representation of Green's function essentially due to Hilbert. (Author)

Harvard U. [Cambridge, Mass.]
SERIES EXPANSIONS OF SOLUTIONS OF THE HEAT EQUATION IN N DIMENSIONS, by D. V. Widder. Rept. on Contract AF 49(638)574. Aug 60, 37p. 4 refs. AFOSR TN-60-912; AD-244 396.
Order from LC mi$3.00, ph$6.30 PB 152 376

This paper is an extension of a recent result by D. V. Widder and P. C. Rosenbloom concerning the expansion of a solution $u(x,t)$ of the heat equation, $u_{xx} = u_t$, in series of polynomial solutions. Whereas that result involved two variables only, the present one permits an arbitrary finite number of variables. It is found that the polynomial solutions of the heat equation in n dimensions are factorable into polynomials in two variables. The expansion problem may be considered as an investigation of the space spanned by linear combinations of these factorable solutions. (Author)

Harvard U., Cambridge, Mass.
THE ZEROS OF INFRAPOLYNOMIALS WITH SOME PRESCRIBED COEFFICIENTS, by O. Shisha and J. L. Walsh. Rept. on Contract AF 49(638)574. July 60, 64p. 37 refs. AFOSR TN-60-541; AD-244 391.
Order from LC mi$3.90, ph$10.80 PB 152 371

The reports considers infrapolynomials $A(z) \equiv a_0 + a_1 z + \ldots + a_n z^n$ on sets S, with prescribed $a_n, a_{n-1}, \ldots, a_{n-\gamma}$ or $a_0, a_1, \ldots, a_k$ or both. The main purpose here is to obtain information on the geometric location of the zeros of such polynomials.

Illinois U. [Urbana]
ON WEIERSTRASS PRODUCTS OF ZERO TYPE ON THE REAL AXIS, by L. A. Rubel and J. P. Kahane (Université de Montpellier). Rept. on Contract AF 49(638)517. 15 July 60, 14p. 8 refs. AFOSR TN-60-807; AD-245 673.
Order from LC mi$2.40, ph$3.30 PB 152 972

Under the well-known restriction

$$\int_{-\infty}^{\infty} (1+r^2)^{-1} \log^+ |f(r)| \, dr < \infty$$

on the rate of growth on the real axis of entire functions of exponential type, the type of a product is the sum of the types of the factors. It is shown here that this is no longer true if these restrictions are relaxed. As a consequence, the "theorem of supports" for certain generalized distributions fails to hold. (Author)

Institute for Fluid Dynamics and Applied Mathematics U. of Maryland, College Park.
THE APPROXIMATION OF SOLUTIONS OF NON-LINEAR DIFFERENTIAL EQUATIONS, by M. D. George. Doctoral thesis. Rept. on Contract AF 49(638)228. Mar 60, 16p. 4 refs. Technical note BN-196; AFOSR-TN-60-329; AD-234 729.
Order from LC mi$2.40, ph$3.30 PB 149 730

Sufficient conditions are given for the convergency of a sequence of operators to a given semigroup of non-linear operators in a Banach space, with applications to the approximation of solutions of non-linear partial differential equations by finite-difference methods. (Author)

Institute for Fluid Dynamics and Applied Mathematics U. of Maryland, College Park.
UPPER AND LOWER BOUNDS FOR QUADRATIC INTEGRALS, AND AT A POINT, FOR SOLUTIONS OF LINEAR BOUNDARY VALUE PROBLEMS, by J. B. Diaz. Rept. on Contract AF 49(638)228. June 59, 53p. 41 refs. Technical note BN-178; AFOSR-TN-59-720; AD-219 685.
Order from LC mi$3.60, ph$9.30 PB 149,729

An introduction is presented to several methods for obtaining reliable, precise, numerically computable upper and lower bounds for a large class of problems of the general nature of those mentioned in the title. For definiteness, only certain specific boundary value problems are considered in detail, although the same procedures can be easily seen to be applicable in more general situations. (Author)

Institute of Mathematical Sciences, New York U. [N. Y.]
ON AN INTEGRAL EQUATION ARISING IN INVERSE SCATTERING, by C. H. Yang. Rept. on Contract AF 19(604)3495. Apr 60, 34p. 5 refs. Research rept. no. EM-155; ERD-TN-60-756; AD-244 089.
Order from LC mi$3.00, ph$6.30 PB 152 431

A method of Fourier transforms and double series is applied for a solution of an integral equation arising in inverse scattering.

Institute of Tech., U. of Minnesota, Minneapolis.
PERIODIC SOLUTIONS OF SINGULAR PERTURBATION PROBLEMS, by Edward R. Rang. Doctoral thesis. Technical rept. no. 1, 15 Sep 56-15 Sep 57, on Problems in the Theory of Ordinary Differential and Difference Equations, Contract DA 11-022-ORD-2042. 9 Oct 57, 88p. 29 refs. OOR rept. 1469.1; AD-146 632.
Order from LC mi$4.80, ph$13.80 PB 149 644

Kansas U., Lawrence.
A METHOD FOR THE SIMULTANEOUS APPROXIMATION OF EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX, by Peter C. Patton. Technical rept. no. 24 on Studies in Eigenvalue Problems, Contract Nonr-583(04). 1959, 74p. 11 refs. AD-231 184.
Order from LC mi$4.50, ph$12.30 PB 152 894

The results of many numerical experiments with an IBM 650 computer on a new method for approximating the eigenvalues and eigenvectors of a real symmetric matrix are described. Although the numerical method is general in nature and could be applied to non-symmetric or complex matrices, the error analysis is valid only for the real symmetric case. The numerical experiments were performed only on sixth and eighth order matrices due to limitations imposed by the small size and slow speed of the computer used. The determination of the minimum conditions under which the method will produce correct answers is considered. Matrices with given eigenvalues were generated on the machine and then reduced in different ways to determine the best usage of the method. The numerical experiments indicate that the method essentially doubles the number of accurate digits of the eigenvalues and elements of the eigenvectors at each iteration. (Author)

Laboratory of Statistical Research, U. of Washington, Seattle.
SAMPLE FUNCTIONS OF STOCHASTIC PROCESSES WITH STATIONARY INDEPENDENT INCREMENTS, by R. M. Blumenthal and R. K. Getoor. Technical rept. no. 34 on Contract Nonr-477(11). 18 Jan 60, 40p. 10 refs. AD-231 424.
Order from LC mi$3.00, ph$6.30 PB 152 900

Let $X = [X(t); t \geq 0]$ be a stochastic process in R_N with stationary independent increments. Problems of the following type concerning the sample functions of X are considered: (1) local Hölder conditions; (2) conditions under which the γ-variation of X over [0, 1] is finite (or infinite); and (3) the relationship between dim E and dim X(E) when E is a Borel subset of [0, 1]. If X is a stable process of index α, then the behavior of the sample functions relative to these 3 properties can be described in terms of the single parameter α. Parameters of this type are defined and investigated for the general class of processes. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A PROGRAM FOR TESTING SEQUENCES OF RANDOM NUMBERS, by Leonard Kleinrock. Rept. on Contract AF 19(604)7400. 25 Oct 60, 27p. 2 refs. 51G-0018.
Order from LC mi$2.70, ph$4.80 PB 152 934

This report describes a program written for the TX-2 Computer, which is capable of testing the randomness of sequences of numbers. A sequence of numbers is defined as random if the numbers in the sequence are identically distributed independent random variables. The program performs a series of tests on the sequence, and displays the results of these tests on the console oscilloscope. A description of each test is given, along with instructions on how to use the program. A set of appendices is also given which presents a portion of the theory applicable to these tests. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A SURVEY OF THE SIMPLIFICATION OF TRUTH FUNCTIONS, by Willard Draisin. Rept. on Contract AF 19(604)7400. 20 Oct 60, 18p. 21 refs. 22G-0054; AD-245 231.
Order from LC mi$2.40, ph$3.30 PB 152 723

This report presents a survey of the progress made in finding a short mechanical procedure for reducing a truth function to its simplest equivalent. The simplification of a normal truth function using methods developed by Quine and Petrick is described in detail. The application of these methods of simplification to truth functions used in controlling systems is discussed. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
WEST FORD COORDINATE CONVERSION PROGRAM, by W. R. Crowther. Rept. on Contract AF 19(604)7400. 1 Nov 60, 7p. 21G-0026.
Order from LC mi$1.80, ph$1.80 PB 153 053

A program has been written to accept points in radar coordinates and convert them to points in an earth-centered non-rotating system. This program will be used to modify the output of the Point Selection program to an acceptable input of the Orbit Determination program. The gain in timing and simplicity make such a conversion advisable.

Michigan State U. [East Lansing].
A BIVARIATE TCHEBYCHEFF INEQUALITY FOR CERTAIN CONVEX SETS, by Albert W. Marshall and Ingram Olkin. Interim technical rept. no. 12 on Contract DA 20-018-ORD-14735. 20 Mar 59, 30p. 5 refs. OOR rept. 1840.9M; AD-211 948.
Order from LC mi$2.70, ph$4.80 PB 149 663

This paper is concerned with obtaining a bound for the probability that a two-dimensional random variable falls in a certain convex set.

Naval Ordnance Lab., White Oak, Md.
AN EXISTENCE THEOREM FOR THE EQUATION $u_{xyz} = f$, by James Conlan. 12 July 60, 24p. 4 refs. Mathematics Dept. rept. M-12; NAVORD rept. 6921; AD-245 565.
Order from OTS $0.75 PB 171 349

This paper proves an existence theorem for a boundary value problem for the partial differential equation $u_{xyz} = f(x, y, z, u, u_x, u_y, u_z, u_{xy}, u_{xz}, u_{yz})$. The method of proof is such as to lead directly to a simple scheme for the numerical solution of such a problem. (Author)

Naval Ordnance Lab., White Oak, Md.
ON CALCULATION SOLUTIONS OF QUASI-LINEAR, FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS, by Avron Douglis. 1 Sep 60, 26p. 9 refs. Mathematics Dept. rept. M-13; NAVWEPS rept. 7254.
Order from OTS $0.75 PB 171 350

A common means to calculate solutions of non-linear hyperbolic partial differential equations, when shocks are present, is to introduce into an otherwise straight-forward difference scheme special terms which might represent the action of a fictitious tempering mechanism, perhaps of some dissipative type. Experience seems to justify the use of such "tempered" schemes, but proofs of convergence are largely incomplete or lacking. In this paper, in the case of a simple type of equation, we shall give convergence proofs for a class of explicit tempering schemes including versions of the von Neumann-Richtmyer and the Lax-Wendroff methods. These results supplement those of a previous paper devoted to tempering schemes of implicit type (and to an explicit scheme with linear viscosity). (Author)

Naval Ordnance Lab., White Oak, Md.
ON THE CAPACITY OF THE ICOSAHEDRON, by James Conlan, J. B. Diaz, and W. E. Parr. 1 Sep 60, 11p. 6 refs. Mathematics Dept. rept. M-14; NAVWEPS rept. 7302.
Order from OTS $0.50 PB 171 354

The numerical estimation of the capacity is one of the chief examples of the actual application of variational methods. The main purpose of the present report is to obtain upper bounds for the capacity of a regular solid by means of a simple trail function. (Author)

Naval Ordnance Lab., White Oak, Md.
THE SOLUTION OF THE CHARACTERISTIC AND THE CAUCHY BOUNDARY VALUE PROBLEMS FOR THE BIANCHI PARTIAL DIFFERENTIAL EQUATION IN n INDEPENDENT VARIABLES BY A GENERALIZATION OF RIEMANN'S METHOD, by H. M. Sternberg (Doctoral thesis) and J. B. Diaz. 27 July 60, 192p. 14 refs. NAVWEPS rept. 7264; AD-246 796.
Order from OTS $3.00 PB 171 351

This report deals with a generalization of a well known method, due to Riemann, for the solution of hyperbolic differential equations. A large class of partial differential equations, containing three, and more, independent variables can be treated by the techniques developed here.

Naval Ordnance Lab., White Oak, Md.
UPPER AND LOWER BOUNDS FOR THE CAPACITANCE OF THE REGULAR SOLIDS, by Wallace E. Parr. 28 Sep 60, 104p. 21 refs. Mathematics Dept. rept. M-15; NAVWEPS rept. 7318.
Order from OTS $2.50 PB 171 355

Upper and lower bounds are given for the Dirichlet integral, principally based upon an extension of a method of G. Pólya and G. Szegö. Numerical bounds are calculated for the capacitance of the five regular solids. In particular, it is found that the number 1.3351 is an upper bound for the capacitance of a cube of side 2.0, an improvement over all upper bounds previously known. (Author)

Naval Ordnance Test Station, China Lake, Calif.
FIRST AID FOR PET PROJECTS INJURED IN THE LAB OR ON THE RANGE OR WHAT TO DO UNTIL THE STATISTICIAN COMES, by R. M. McClung. 29 Jan 52, 59p. 11 refs. Technical memo. 1113.
Order from OTS $1.50 PB 171 327

The concept of confidence, the use and computation of confidence and tolerance limits, and a method for determining the significance of the difference in two or more sample means are discussed in an elementary manner. (Author)

Numerical Analysis Research, U. of California, Los Angeles.
COMPLETE SYSTEMS OF SOLUTIONS FOR A CLASS OF SINGULAR ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS, by Peter Henrici. Technical rept. on Contract DA 04-495-ORD-559. 1 Feb 60, 22p. 9 refs. AD-232 388.
Order from LC mi$2.70, ph$4.80 PB 153 275

Reprint from Boundary Problems in Differential Equations; Proceedings of a Symposium conducted by Mathematics Research Center, U. of Wisconsin, 20-22 Apr 59, p. 19-24.

Princeton U. [N. J.]
ANALYTIC SPACES. PART I, by Hugo Rossi. Rept. on Contract AF 49(638)692. Feb 60, 88p. 8 refs. AFOSR [TN]-60-283; AD-234 814.
Order from LC mi$4.80, ph$13.80 PB 149 649

Contents:
Irreducible varieties
Nullstellensatz
The density theorem
The regular points
The singular set
Coherence of sheaves
The density theorem
Coherence of the sheaf of a variety
Abbildungsatz

Purdue U., Lafayette, Ind.
GROUP COMMUTATORS OF BOUNDED OPERATORS IN HILBERT SPACE, by C. R. Putnam. Technical note no. 12 on Commutators on a Hilbert Space, Contract AF 18(603)139. Oct 60, 6p. 4 refs. AFOSR-TN-60-718; AD-245 344.
Order from LC mi$1.80, ph$1.80 PB 152 761

Various conditions on operators A and B in order that $AD = DA$, where $D = ABA^{-1}B^{-1}$, implies $AB = BA$ are discussed. (Author)

Purdue U., Lafayette, Ind.
A NOTE ON THE SPECTRA OF GROUP COMMUTATORS, by C. R. Putnam. Technical note no. 13 on Commutators on a Hilbert Space, Contract AF 18(603)139. Oct 60, 6p. 8 refs. AFOSR-TN-60-744; AD-245 343.
Order from LC mi$1.80, ph$1.80 PB 152 762

There are obtained results on the location of the spectrum of $ABA^{-1}B^{-1}$ in case A commutes with AB - BA. (Author)

Rensselaer Polytechnic Inst., Troy, N. Y.
LINEAR DIFFERENTIAL EQUATIONS WITH RANDOM NONHOMOGENEITIES, by William E. Boyce. Rept. on Contract AF 18(600)1586. 17 Dec 59, 12p. RPI MathRep no. 29; AFOSR TN-59-1260; AD-230 946.
Order from LC mi$2.40, ph$3.30 PB 153 382

A method is proposed for dealing with the effects of certain types of random perturbations in systems governed by linear differential equations. When these perturbations occur as a nonhomogeneous term in the differential equation, the solution is represented by means of an integral involving the random nonhomogeneity, both for boundary and initial value problems. This integral can be commuted with the integrals representing statistical moments. Several consequences of this fact are discussed. (Author)

Syracuse U., N. Y.
ITERATIONS WITH ERRORS, by Peter Frank. Research rept. 28 on Contract AF 49(638)265. Aug 60, 17p. 5 refs. AFOSR-TN-60-1095; AD-245 277.
Order from LC mi$2.40, ph$3.30 PB 152 736

Let M be a complete metric space, and T a transformation of M into itself. There are seven sections: (1) M a complete metric space, no errors. A statement of the contracting mapping theorem; (2) M a complete metric space, bounded errors. Bounds for the accumulated error. (3) M the real numbers, errors random. Existence of a limiting distribution; (4) M a Banach space, errors random. Existence of a limiting distribution; (5) Markov processes and integral equations; (6) M a Banach space, T a linear transformation Characteristic functions; (7) M the real numbers, errors bounded. Bounds on the asymptotic bias and mean square error.

Syracuse U., N. Y.
ON THE MEASURABILITY OF FUNCTIONS IN TWO VARIABLES, by Mark Mahowald. Research rept. no. 29 on Contract AF 49(638)265. Aug 60, 8p. 4 refs. AFOSR-TN-60-1096; AD-245 278.
Order from LC mi$1.80, ph$1.80 PB 152 737

This report contains two sections, each essentially independent of the other. In (1) the question of joint measurability of a function of two variables given continuity in one and another condition is studied. The main result is a general theorem on metric compact spaces. (2) is concerned with the existence of a measurable modification of a given stochastic process. Necessary and sufficient conditions are obtained. (Author)

University of Southern California [Los Angeles].
A NON-LINEAR EIGENVALUE PROBLEM FOR HARMONIC FUNCTIONS, by John A. Ferling. Technical rept. on Contract Nonr-228(09). Mar 60, 11 refs. AD-237 809.
Order from LC mi$3.60, ph$9.30 PB 148 066

A non-linear eigenvalue problem related to the linear problem is considered. In the linear problem, a function u is to be found which is a regular harmonic function in a region D and which satisfies, on the boundary of D, the condition $(\partial u/\partial n) = -\Lambda_i u$, where Λ_i is a real positive parameter and n the inward normal. In the non-linear problem, the boundary condition is replaced by $(\partial u/\partial n) = -\Lambda f(u)$ with f(u) being the sum of the linear part u and a non-linear part $g(u) = Au^2 + u^3 h(u)$, where A is a constant and h(u) a continuously differentiable function. Let Λ_i^p be the values of Λ_i for which

the linear problem has solutions. The non-linear problem if investigated for values of the positive parameter Λ near the Λ_i^p.

Washington U., St. Louis, Mo.
ON REAL CHARACTERS OF CERTAIN SEMI-GROUPS WITH APPLICATIONS, by Allen Devinatz and A. E. Nussbaum. Rept. on Contract AF 49(638)218 and National Science Foundation Grant NSF-G10715. June 60, 28p. 10 refs. AFOSR-TN-60-642; AD-245 119.
Order from LC mi$2.70, ph$4.80 PB 152 747

Washington U., Seattle. Div. of Counseling and Testing Services.
AN IBM TYPE 650 PROGRAM FOR COMPUTING CORRELATION COEFFICIENTS BETWEEN PAIRED VARIABLES, by Leon Muhlick, Prem Shanker, and August Dvorak. Rept. on Contract Nonr-477(08) and Public Health Research Grant M-743(C5). Mar 60, 11p. 3 refs.
Order from LC mi$2.40, ph$3.30 PB 148 609

Wayne State U. [Detroit, Mich.]
PROBLEMS ON CONFORMAL MAPS OF RIEMANNIAN AND KAEHLERIAN MANIFOLDS, by S. I. Goldberg. Rept. on Contract AF 49(638)14. July 60, 21p. 11 refs. AFOSR TN-60-867; AD-244 303.
Order from LC mi$2.70, ph$4.80 PB 152 436

Some problems on conformal maps of Riemannian and Kaehlerian manifolds are studied. Let M^m be a compact and orientable Riemannian manifold with metric g on which there is defined an harmonic p-form α whose coefficients $a_{i_1 \ldots i_p}$ satisfy the property (P): $a_{i}^{\ i_2 \ldots i_p} a_{j i_2 \ldots i_p} = g_{ij}$. Such a space is called an H(m, p).

Computing Devices

International Business Machines Corp., Kingston, N. Y.
CIRCUITS AND COMPONENTS IMPROVEMENT PROGRAM, ECPX 0002. Final rept on Contract AF 30(635)3130. 1 Jan 58, 52p. AD-150 401.
Order from LC mi$3.60, ph$9.30 PB 153 274

Contents:
Circuits and components improvement program
Transistor component evaluation and circuit design
Magnetic core and core circuit development
Semiconductor component development and application
Printed circuits and components
Component reliability study
Tabulated results

Lincoln Lab., Mass. Inst. of Tech., Lexington.
GENDARE SYSTEM: FUNDAMENTAL CONCEPTS OF LOGIC AND STRUCTURE, by J. B. Williams, Jr. Rept on Contract AF 19(604)7400. 17 Oct 60, 20p. 22G-0042; AD-245 234.
Order from LC mi$2.40, ph$3.30 PB 152 722

GENDARE (Generalized Data Reduction) is a programming system to provide data reduction services easily and cheaply when large volumes of data are to be processed. GENDARE design starts with the observation of logical redundancies in the class of programs devoted to data reduction. On this basis the existence of a general case for this program class is postulated, assumptions made about the form of the inputs, and determining characteristics discussed for the processing to be performed. From this foundation the fundamental elements of GENDARE logic and structure are developed as a natural consequence. (Author)

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
HUMAN FACTORS CONSIDERATIONS IN THE DESIGN OF ELECTRONIC COMPUTERS; by R. O. Lucier and E. J. Parker. Final rept. for 1 July 59-30 June 60 on Task B, Contract DA 36-039-sc-75047. 30 June 60, 53p. 8 refs. AD60UR1; AD-243 632.
Order from LC mi$3.60, ph$9.30 PB 153 596

This report released for sale to the public 6 Jan 61.

The necessity of considering the human element in the design of computer equipment, especially in the design of the operators' consoles for the FIELDATA equipment family is discussed. The main text is divided into three sections, which are concerned with the design of operators' consoles, the use of human factors by producers of electronic computers, and the consideration of the human component of man-machine relationships in the area of ADPS. Several arguments are put forth, one of which is the need to standardize various aspects of design in the control panels of consoles. Another fact that the author points out is the problem of ADP personnel - the growing need for programmers and the dwindling source of manpower, the high production of computers and the inability to find enough personnel to handle them. The appendix is concerned with various aptitude and psychological tests administered to people in ADPS. It discusses and compares the tests and the results of such tests. (Author)

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
INFORMATION RETRIEVAL AND THE DESIGN OF MORE INTELLIGENT MACHINES, by Harry J. Gray, Jr. and Edward J. Parker. Final rept. for 1 July 59-30 June 60 on Task E, Contract DA 36-039-sc-75047. 30 June 60, 77p. 8 refs. AD60UR1; AD-243 490.
Order from LC mi$4.50, ph$12.30 PB 153 597

This report released for sale to the public 6 Jan 61.

Existing digital computers and data processing systems require exceptionally competent and intelligent people for their programming, operation, and maintenance. In order to reduce the requirements on the personnel it becomes necessary to design the machines so that they have more intelligence. The first effort toward enabling the machine to make its own associations gave rise to the information processing languages of Newell and Simon. Our study of the operations involved in human cognitive process has resulted in an extension of the Newell-Simon Information Processing Languages (IPL) to a multiple list data organization

where each data item appears only once in an addressable memory, yet the item has in it several descriptors with control information that place the data item in several lists. Such a system has been shown to be well-suited to information retrieval problems. A specification of a parallel-access information bank, which may be more efficient than the multiple-list system, has been previously prepared. Central to the list machine and the parallel-access information-bank problem, is the problem of descriptor recognition. In this report, the problem is defined and progress towards its solution is stated. (Author)

Moore School of [Electrical] Engineering, U. of Pennsylvania, Philadelphia.
LINEAR BOUNDED AUTOMATA, by John Myhill. Rept. on Automatic Computation and Control Techniques, Contract AF 33(616)5886. June 60, 29p. 6 refs. Rept. no. 60-22; WADD Technical note 60-165.
Order from OTS $0.75 PB 171 339

This report presents a new concept, that of a linear bounded automaton. Such automata can do more than finite automata, but cannot do as much as Turing machines. A full discussion of the concept is given, followed by a proof that all classes of tapes of a certain kind are representable by linear bounded automata. The report concludes with a proof that all classes of tapes representable by linear bounded automata are primitive recursive. (Author)

Naval Research Lab., Washington, D. C.
A SEMICONDUCTOR BINARY COORDINATE CONVERTER, by M. F. Williams, A. F. Thornhill, and W. A. Richards. Final rept. on one phase. 16 Nov 60, 15p. 5 refs. NRL rept. 5534.
Order from LC mi$2.40, ph$3.30 PB 149 297

The characteristics of a semiconductor binary digital coordinate converter have been investigated. This equipment converts 18-bit polar-coordinate data to 20-bit rectangular-coordinate data in three milliseconds. The equations used are: $X = \rho \sin \theta$ and $Y = \rho \cos \theta$. Sine θ and cosine θ are obtained by the use of a rectangular diode matrix and diode trigonometric function tables; X and Y are obtained by summing partial products in a parallel accumulator type multiplier. The converter occupies a volume of less than two cubic feet and requires one ampere at 20 volts and 200 milliamperes at 90 volts. Methods of increasing the operating rate of the converter have been considered. (Author)

MECHANICS

Illinois Inst. of Tech., Chicago.
PLASTIC PRINCIPLES OF MINIMUM ENERGY RATES by Philip G. Hodge, Jr. Rept. on Contract Nonr 140604. Mar 60, 12p. 14 refs. DOMIIT rept. no. 1-11; AD-236 999.
Order from LC mi$2.40, ph$3.30 PB 147 310

Two new minimum principles are proved for an elastic/plastic material. (1) Among all compatible velocity fields the actual one minimizes the instantaneous change in the potential energy. (2) Among all equilibrium stress rate fields which do not violate the yield condition, the actual one minimizes the instantaneous change in the complementary energy. (Author)

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
A NEW DECOMPOSITION FORMULA IN THE THEORY OF ELASTICITY, by J. H. Bramble and L. E. Payne. Rept. on Contract AF 49(638)228. Sep 60, 15p. 7 refs. Technical note BN-218; AFOSR-TN-60-1129; AD-244 833.
Order from LC mi$2.40, ph$3.30 PB 152 609

A new representation formula for the spherical components of displacement in the theory of elasticity is obtained. This formula may be used to reduce mixed boundary value problems for the elastic sphere to standard problems in potential theory. (Author)

Institute of Engineering Research, U. of California, Berkeley.
PROPAGATION OF AXISYMMETRIC WAVES IN AN UNLIMITED ELASTIC SHELL, by A. Kalnins and P. M. Naghdi. Technical rept. no. 8 on Contract Nonr-222(69). Mar 60, 21p. 15 refs. Series 131, issue 8; AD-238 156.
Order from LC mi$2.70, ph$4.80 PB 148 405

The propagation of axisymmetric stress waves in unlimited thin shallow elastic spherical shells is investigated. In particular, a solution is obtained for an unlimited shallow spherical shell subjected to a harmonically oscillating concentrated load at the apex. This solution, exact within the scope of the linear theory of shallow shells, has an outward propagating wave character in the entire range of forcing frequency. Appropriate expressions for the mechanical impedance and the energy input are derived, and numerical results are obtained for the axial displacement corresponding to various forcing frequencies. (Author)

Institute of Mathematical Sciences, New York U., N. Y.
A THEORY FOR THE SMALL DEFORMATIONS OF CYLINDRICAL SHELLS. PART I. ROTATIONALLY SYMMETRIC DEFORMATIONS, by Edward L. Reiss. Rept. on Contract Nonr-285(42). July 59, 35p. 16 refs. IMM-NYU 260; AD-229 513.
Order from LC mi$3.00, ph$6.30 PB 149 691

Mathematics Research Center, U. of Wisconsin, Madison.
PLANE ELASTIC SYSTEMS, II. THE COMPLEX STRESSES AND THEIR PROPERTIES IN THE ISOTROPIC CASE, by L. M. Milne-Thomson. Rept. on Contract DA 11-022-ORD-2059. Dec 58, 41p. 10 refs. MRC Technical summary rept. no. 63.
Order from LC mi$3.30, ph$7.80 PB 149 756

The report which follows aims to describe and unify the properties of the two functions of the complex variable in terms of which the solution of plane problems may be expressed in the case of isotropic material undergoing infinitesimal elastic deformation. As the report

in effect deals with plane geometry it is more convenient and intuitive to refer to the material as if it were in the form of a thin plate. In so doing there is no loss of generality, for one can proceed from this case of generalized plane stress to the case of plane deformation by a mere change in the value of the elastic constant.

Naval Ordnance Test Station, China Lake, Calif.
TRANSVERSE VIBRATIONS OF THIN RECTANGULAR ISOTROPIC PLATES, by Ralph W. Claassen and Charles J. Thorne. 18 Aug 60, 187p. 7 refs. NOTS TP 2379; NAVWEPS rept. 7016.
Order from LC mi$8.40, ph$28.80 PB 152 632

A general method for the solution of boundary value problems is illustrated by developing the formulas necessary for determining the frequencies and nodal patterns in the free vibrations of thin rectangular plates. Numerical results are obtained for two frequently occurring boundary conditions: clamped all around and clamped on two opposite edges, free on two opposite edges. Curves are given for the determination of the "first" ten and eleven frequencies, respectively, and their nodal patterns as a function of the ratio of sides. The parameter K, which determines the frequency and nodal patterns, is independent of Young's modulus, density, thickness and Poisson's ratio in the first example. In the second example Poisson's ratio of .3 is used to determine K. K is expected to be only slightly dependent on Poisson's ratio. (Author)

Pennsylvania State U., University Park.
RESEARCH AND DEVELOPMENT ON THEORETICAL AND EXPERIMENTAL STUDIES ON MECHANICS OF METAL FORMING, by Owen Richmond, L. W. Hu, and Joseph Marin. Final rept. on Contract DA 36-061-ORD-435. 1 Sep 55, 80p. 20 refs.
Order from LC mi$4.50, ph$12.30 PB 153 109

Experimental studies of the plastic deformation of a flat plate compressed between flat plates, the plastic indentation of a billet by a wedge and the plastic indentation of a billet by a cone. Measurements were made of the total applied load, total deformation, pressure distribution on the die surface and strain distribution within the billet. The test results were interpreted by a plasticity theory which neglects the elastic deformations and assumes no strain hardening. The theory was found to be suitable for the interpretations of the test results obtained in this study.

Polytechnic Inst. of Brooklyn, N. Y.
ON THE DYNAMICS OF PLASTIC SPHERICAL SHELLS, by R. Sankaranarayanan. Rept. on Contract AF 49(638)302. Sep 60, 23p. 9 refs. PIBAL rept. no. 580; AFOSR-TN-60-1165; AD-244 945.
Order from LC mi$2.70, ph$4.80 PB 152 779

This paper discusses the behavior of complete spherical shells and simply supported spherical caps under impulsive loading by uniform external pressure. The pressure is assumed to be greater than the static collapse pressures and to act for a short period of time. The displacements of the shells are presented for particular values of the parameters of the problem. (Author)

Aerodynamics and Pneumatics

Arnold Engineering Development Center [Tullahoma, Tenn.]
THE DESIGN AND EVALUATION OF A TRANSISTORIZED CURRENT AMPLIFIER WITH A BANDWIDTH OF DC TO 100 KC, by W. M. Crouch. Rept. on ARO, Inc. Contract AF 40(600)800 S/A 11(60-110). Oct 60, 24p. 5 refs. AEDC-TN-60-194.
Order from LC mi$2.70, ph$4.80 PB 152 843

Analog data are transmitted from the operating wind tunnels of the VKF to a magnetic tape system for recording via co-axial transmission lines. To insure that these data, when received by the magnetic tape system, are accurate reproductions of the transmitted signal, the co-axial lines must be properly terminated in a low impedance. The amplifier which drives these lines should have a response of dc to at least 100 kc in order not to limit the data transmission below the capabilities of the magnetic recording system. Both of these qualities, low output impedance and the necessary frequency response, are incorporated in the transistorized current amplifier which is described in this report. Design, performance, operation, and evaluation are discussed. (Author)

Arnold Engineering Development Center [Tullahoma Tenn.]
FORCE TESTS OF AN AGARD CALIBRATION MODEL B AT M= 2.5 TO 6.0, by Jack D. Coats. Rept. on ARO, Inc. Contract AF 40(600)800 S/A 11(60-110). Oct 60, 30p. 7 refs. AEDC-TN-60-182.
Order from LC mi$2.70, ph$4.80 PB 152 556

An AGARD Calibration Model B body-wing configuration was tested in the 40-in. supersonic wind tunnel (Tunnel A) of the von Karman Gas Dynamics Facility. Force and moment coefficients were determined over a range of pitch and yaw angles from -4 to +10 deg at Mach numbers from 2.5 to 6.0. The Reynolds number range was from 2×10^6 to 24×10^6 based on body length. The lift and pitching-moment characteristics of the 5.8-in.-diam model used in these tests are in good agreement with results obtained earlier on a 2-in. model tested in the 40-in. tunnel and a 1.4-in. model tested in the 12-in. tunnel at the von Karman Facility. The forebody drag coefficients for the 5.8-in.-diam model are in general lower than those for the smaller models. Variations in Reynolds number were not of sufficient magnitude to produce turbulent flow over more than 55 percent of the body length and produced only small variations in the drag coefficients with no effect on the lift and pitching-moment coefficients. The rates of change of the location of boundary layer transition with Reynolds number were identical to those determined in the 12-in. tunnel and were influenced by the presence of the wing. (Author)

Ballistic Research Labs., Aberdeen Proving Ground, Md.
LIGHTNING STORM IN A SUPERSONIC WIND TUNNEL, by Anders S. Platou. Aug 60, 25p. Rept. no. 1113; AD-244 819L.
Order from LC mi$2.70, ph$4.80 PB 152 602

This is a study of an electrostatic charge which is generated in a supersonic tunnel when the air flowing through the De Laval nozzle contains a considerable amount of water vapor. If a pointed probe which is electrically grounded is mounted in the air stream a purple glow exists on the tip of the probe. If the probe is insulated from ground a positive potential of several thousand volts accumulates on the probe. The amount of charge which accumulates is a function of the humid ity level of the air and the position of the probe in the nozzle. (Author)

Bolt, Beranek and Newman, Inc., Cambridge, Mass.
RESPONSE OF PLATES TO MOVING SHOCKS, by Eric E. Ungar. Rept. on Dynamic Problems in Flight Vehicles, Contract AF 33(616)6217. Aug 60, 37p. 15 refs. WADD Technical rept. 60-445.
Order from OTS $1.00 PB 171 302

General expressions for plate responses to pressure variations are derived in terms of generalized coordinates associated with the plate normal mode-shapes. The expressions are then specialized for moving pressure discontinuities, which correspond to shocks. The responses of simple supported rectangular plates to uniformly moving and to sinusoidally and randomly oscillating shocks are determined in detail for shocks parallel to a pair of edges. The importance of the mechanisms of trace-matching, force-resonsnace, and moment-resonance, is established. (Author)

Catholic U. of America, Washington, D. C.
ELEMENTARY MECHANICS OF TURBULENT FLUID MOTION, by Max M. Munk. Rept. on Contract AF 49(638)516. Mar 60, 150p. 13 refs. AFOSR-TR-60-6; AD-235 018.
Order from LC mi$7.20, ph$22.80 PB 149 686

Order and system in the happenings of turbulent fluid motion was analyzed. A system of turbulence mechanics was established having many good features. It is complete in that there are enough equations in relation to the unknown involved. The independent variables from a harmonious and plausible system, which can hardly be improved without enlarging it. The equations are expressed and very simple. Two principal coefficients are shown to be often constants. They are the shear coefficient $\tau/K\rho$ and the rotation coefficient $S\,dU/dy/\sqrt{}$. They illustrate the separation of the dynamic effects and the diffusive effects taking place. Results show that the 2 principal turbulence effects have little inclination to combine to joint action. The analysis was carried far enough for establishing even the numerical information needed, although only provisional, and subject to revision and refinement. The order of magnitude of the major multipliers was definitely established. (Author)

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
HEAT TRANSFER TO SHARP AND BLUNT YAWED PLATES IN HYPERSONIC AIRFLOW, by J. G. Hall and T. C. Golian. Rept. on Contract AF 18(603)10. Sep 60, 9p. 5 refs. Rept. no. AD-1052-A-11; AFOSR TN-60-938.
Order from LC mi$1.80, ph$1.80 PB 152 947

The purpose of this note is to report recent experimental results for heat-transfer distributions over sharp and blunt plates at yaw with zero angle of attack.

Israel Inst. of Tech., Haifa.
ON ROTATIONAL SUPERSONIC FLOW PAST THICK AIRFOILS: TABLES, by A. Kogan and A. A. Betser. Final rept. on Contract AF 61(052)281. June 60, 78p. 1 ref. AFOSR-TR-60-135; AD-244 457.
Order from LC mi$4.50, ph$12.30 PB 152 479.

Certain shock wave parameters, which appear in the calculation of pressure distribution on airfoils in a supersonic rotational flow, are presented in tabular form. The method underlying the use of the tables is summarized and discussed. A numerical example is worked out in detail, illustrating the procedure to be followed in the application of the tables. (Author)

National Research Labs., Ottawa (Canada).
AERODYNAMIC SOUND AND PRESSURE FLUCTUATIONS IN A SUPERSONIC BLOWDOWN WIND TUNNEL, by R. Westley. Jan 60, 62p. 18 refs. Aeronautical rept. LR-274; AD-244 858.
Order from LC mi$3.90, ph$10.80 PB 152 529

An investigation was made of the pressure fluctuations in the settling chamber and working section and of the exterior sound fields of the N. A. E. 5-inch supersonic blowdown wind tunnel. Intense pressure fluctuations were found in the settling chamber of the wind tunnel. These fluctuations were a function of the flow conditions at the control valve which suggested that they were aerodynamic noise originating from the jet of the control valve. Below a working section Mach number of 3, the fluctuations in the working section were found to be predominantly those which had been transmitted from the settling chamber. The attenuation of the transmission increased with increase of working section Mach number and at Mach numbers greater than 3 the working section fluctuations became almost independent of the fluctuations in the settling chamber. The sound field surrounding the wind tunnel and the sound pressure levels at the exit of the exhaust diffuser were also measured. (Author)

National Research Labs., Ottawa (Canada).
DESCRIPTION OF THE SPRAY RIG USED TO STUDY HELICOPTERS IN FLIGHT, by D. L. Bailey. Sep 60, 21p. 1 ref. Aeronautical rept. LR-186A.
Order from LC mi$2.70, ph$4.80 PB 153 195

A description of the spray rig used to study icing on helicopters in hovering flight. Details of operation, instrumentation and the calculated performance are given. (Author)

National Research Labs., Ottawa (Canada).
THE STATIC AND FORWARD SPEED TESTING OF A FLAPPED WING WITH BOUNDARY LAYER CONTROL FOR USE IN DEFLECTING PROPELLER SLIPSTREAMS DOWNWARD FOR VERTICAL TAKE-OFF. PART I, by B. Neal. July 60, 127p. 11 refs. Aeronautical rept. LR-288.
Order from LC mi$6.30, ph$19.80 PB 153 196

Force and moment data are presented for a four-propeller model of a slipstream deflection type VTOL aircraft wing employing a slotted forward flap together with a plain rear flap over which boundary layer control air was blown. Tests were performed out of ground effect both statically and at forward speed for a wide range of flap settings on a mobile test rig that can be towed at speeds up to 50 ft./sec. The mobile test rig developed at this laboratory is a useful tool for research into low speed flight and it enables transition manoeuvres of VTOL aircraft to be studied successfully. Useful improvements in the performance of slipstream deflection VTOL aircraft can be made by the use of boundary layer control over the flap system. (Author)

Naval Supersonic Lab., Mass. Inst. of Tech., Cambridge.
INITIAL CALIBRATION OF THE HYPERCORE INSTALLATION AT M=7.6, by Jacques A. F. Hill. Rept. on Contract Nonr-1841(40). Mar 60, 35p. 6 refs. Technical rept. 437; AD-239 875.
Order from LC mi$3.00, ph$6.30 PB 149 344

The Mach number and stagnation temperature distributions obtained in the calibration of a 12-inch diameter, M=7.6 nozzle are presented. Model blockage limits are given for axisymmetric models at zero yaw and for low-aspect-ratio wings at large angles of attack. Brief descriptions are also given the (unconventional) tunnel circuit and the nozzle design and fabrication processes. (Author)

Polytechnic Inst. of Brooklyn, N. Y.
HIGHER ORDER THEORY OF CURVED SHOCK, by Ruben R. Chow and Lu Ting. Rept. on Aerodynamic and Heat Transfer Problems in Hypersonic Flow, Contract AF 33(616)6118. Aug 60, 30p. 11 refs. PIBAL rept. no. 609; ARL Technical note 60-142.
Order from LC mi$2.70, ph$4.80 PB 152 537

The next order conditions (of order of the reciprocal of Reynolds number) across a two-dimensional shock have been established to include the effects of heat conduction, viscosity and the shock structure. These shock conditions involve the local shock curvature in addition to its local inclination. Explicit results have been obtained for the corrections in the mass flux across the shock, the stagnation enthalpy, the tangential component of velocity and the normal component of momentum flux. Numerical results are presented for Prandtl number equal to 3/4. (Author)

Princeton U., N. J.
THE ANOMALY IN THE APPLICATION OF PLK AND PARABOLIC COORDINATES TO THE TRAILING EDGE BOUNDARY LAYER, by Arnold Goldburg and Sin-I Cheng. Rept. on Contract AF 49(638)465. Apr 60, 18p. 9 refs. Rept. 519; AFOSR-TN-60-650.
Order from LC mi$2.40, ph$3.30 PB 152 738

The application of the PLK method to the leading edge of a flat plate predicted the well known optimum parabolic coordinate system for boundary layer analysis. The coordinate system applicable to the trailing edge problem as predicted by the PLK method is found to differ from the conventional parabolic boundary layer coordinates by an order of magnitude. (Author)

Princeton U., N. J.
ON THE FLOW OF GASES UNDER NEARLY FREE MOLECULAR CONDITIONS, by D. Roger Willis. Rept. on Contract AF 49(638)465. Dec 58, 92p. 21 refs. Rept. no. 442; AFOSR-TN-58-1093; AD-207 594.
Order from LC mi$5.40, ph$15.30 PB 149 677

The present study is part of a program of theoretical and experimental research in high speed gas dynamics. Various methods of analysis of Boltzmann's equation are discussed, with emphasis on those applicable when the gas medium is sufficiently rarefied that conditions are close to free molecular.

University of Southern California. Engineering Center, Los Angeles.
HEAT ADDITION TO A ONE-DIMENSIONAL SUPERSONIC FLOW INCLUDING REAL GAS EFFECTS, by Serge Albert Waiter. Rept. on Contract AF 40(600)857. Sep 60, 33p. 3 refs. USCEC-R-73-201; AEDC TN-60-180.
Order from LC mi$3.00, ph$6.30 PB 152 557

The thermodynamic study of heat addition process in a supersonic flow is presented, taking account of the effects of dissociation and ionization; the only hypothesis proposed is that the flow is in thermodynamic equilibrium at each point. The specific mechanism of the heat source is not given in detail in this paper, but, it will be supposed that the heat added to the system is steady and constant per unit distance along the nozzle axis. (Author)

Hydrodynamics, Hydraulics, and Hydrostatics

Brown U. Div. of Applied Mathematics, Providence, R. I
INVISCID MODES OF INSTABILITY IN COUETTE FLOW, by W. H. Reid. Technical rept. no. 30 on Contract Nonr-562(07). Jan 60, 27p. 6 refs.
Order from LC mi$2.70, ph$4.80 PB 152 857

An exact solution is presented for the inviscid modes of instability in Couette flow. When the cylinders rotate in the same direction, only one mode of instability is present. It corresponds to the convective modes found in the existing viscous treatments of the problem. When the cylinders rotate in opposite directions, however, two types of instability are present, the second being of an oscillatory type. These results suggest that although the 'principle of exchange of stabilities' may be valid when the cylinders rotate in the same direction, it may not be valid when they rotate in opposite directions. (Author)

Brown U. Div. of Applied Mathematics, Providence, R. I.
THE STABILITY OF NON-DISSIPATIVE COUETTE FLOW IN THE PRESENCE OF AN AXIAL MAGNETIC FIELD, by W. H. Reid. Technical rept. no. 31 on Contract Nonr-562(07). Jan 60, 7p. 3 refs.
Order from LC mi$1.80, ph$1.80 PB 152 858

The effect of an axial magnetic field on the stability characteristics of Couette flow in the limiting case of zero viscosity and infinite conductivity has been examined recently by Chandrasekhar, who showed that an adverse gradient of angular velocity can always be stabilized by a sufficiently strong magnetic field and that the required field strength can be derived from the solutions of the related non-magnetic problem. Within the framework of the "small gap" approximation, the non-magnetic problem has recently been solved exactly, and this paper, therefore, presents a determination of the magnetic field strength required to completely stabilize the flow.

California Inst. of Tech., Pasadena.
CAVITATING FLOW PAST A CASCADE OF CIRCULAR ARC HYDROFOILS, by A. J. Acosta. Rept. on Contract Nonr-220(24). Mar 60, 40p. 8 refs. Engineering Div. rept. no. E-79-2; AD-237 442.
Order from LC mi$3.00, ph$6.30 PB 147 535

A linearized theory was presented of the cavitating flow through a cascade of circular arc hydrofoils. Only the case of cavities of infinite length was treated. Normal force coefficients are given for a range of stagger angles and angles of attack for a camber of 16°. Comparison of the results of the linear theory with an exact theory for flat plate cascades indicates that the theory is limited to values of the stagger angle of about 60°, at least for an angle of attack of 6°. Solidity is observed to have a dominant effect on the normal force coefficient, although, when the angle of attack is measured from the mean of the entering and leaving angles, the discrepancy from the results of isolated theories is sharply reduced. No appreciable cascade effect occurs up to about a solidity of one half if the angle of attack is so determined. (Author)

David Taylor Model Basin, Washington, D. C.
A 36-INCH VARIABLE PRESSURE WATER TUNNEL, by W. F. Brownell. June 56, 78p. 9 refs. Rept. 1052.
Order from LC mi$4.50, ph$12.30 PB 153 574

This report released for sale to the public 6 Jan 61.

A new 36-inch variable pressure water tunnel for the David Taylor Model Basin is described. Design information concerning the tunnel components, electric drives, instrumentation, auxiliary equipment and the building is presented. (Author)

James Forrestal Research Center, Princeton, N. J.
TURBULENCE THEORY AND FUNCTIONAL INTEGRATION, by Gerald Rosen. Rept. on Contract Nonr-1858(25). July 59, 25p. 14 refs. Proj. Squid Technical rept. PR-96-P.
Order from LC mi$2.70, ph$4.80 PB 149 689

An integral representation of the general solution to the Hopf ϕ-equation is reported. Integral representations for the spatial correlation functions are derived from the characteristic functional ϕ. These exact results are applied to Navier-Stokes fluid turbulence. (Author)

Technische Hogeschool, Delft (Netherlands).
UNSTEADY MOTION OF A FLAT PLATE IN A CAVITY FLOW, by J. A. Geurst. Rept. no. 21 on Contract N62558-2269. June 59, 42p. 18 refs. AD-225 975.
Order from LC mi$3.30, ph$7.80 PB 149 640

A flat plate is placed in a flow of an incompressible non-viscous fluid with uniform velocity perpendicular to the plate. Behind the plate a cavity with reentrant jet has formed. The jet is supposed to disappear on a second sheet of the physical plane considered as a Riemann surface. This artifice is used to represent within the framework of potential theory the dissipation of energy, that is observed at the rear end and in the interior of the cavity. The reentrant-jet model was preferred over the Riabouchinsky model, since the former shows more resemblance to experimental observations. When the plate performs an unsteady motion, the shape and size of the cavity will change. Assuming that the deviation from the steady position is small in a certain sense, this unsteady motion can be considered as a perturbation of the original steady flow (linearization of the unsteady effects). The stationary flow is first treated, followed by an investigation of the unsteady motion. (Author)

Statics, Kinematics, and Kinetics

Bolt, Beranek and Newman, Inc., Cambridge, Mass.
FREE OSCILLATIONS OF EDGE-CONNECTED SIMPLY SUPPORTED PLATE SYSTEMS, by Eric E. Ungar. Rept. on Contract Nonr-2322(00). 11 Jan 60, 40p. 3 refs. Rept. no. 721; AD-231 848.
Order from LC mi$3.00, ph$6.30 PB 152 906

A simple semi-graphical method for calculating the natural frequencies of 2-plate systems is developed, where a 2-plate system is defined as one made up of 2 rectangular plates simply supported at all edges and joined at a common edge. Equations for the mode shapes are given. It is demonstrated that at higher modes the component plates become effectively uncoupled in general; the modes for which coupling is most severe are indicated. Charts for easy determination of the aforementioned natural frequencies are presented. One of these gives, as a by-product, the natural frequencies of rectangular plates (of any dimensions) having one edge clamped, the remaining 3 simply supported. (Author)

Bureau of Naval Weapons, Washington, D. C.
FORCE 0 TO 60,000 LBS. (APPROX.) TENSION ONLY. BuWeps-BuShips Calibration Program. 15 July 60, 34p. Secondary Standards Lab. Measurement System Operation Procedure NF-02.
Order from OTS $0.75 PB 171 203

This procedure describes the operation of a secondary standards laboratory calibration system which is used to calibrate static force sensing instruments.

METALLURGY

HANDBOOK OF SOVIET ALLOY COMPOSITIONS.
25 Aug 59, 258p. 386 refs.
Order from OTS $4.00 PB 171 331

This handbook identifies Soviet metal and alloy designations and their corresponding composition ranges. Although the applications of these materials are not generally considered in this compilation, two groups of steels are segregated, i.e., special-purpose steels and tool steels. The essential material is presented in 21 tables.

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
EXPLORATORY INVESTIGATION OF X2020 HIGH TEMPERATURE ALUMINUM ALLOY, by E. F. Deesing and S. J. Ketcham. Apr 59, 26p. Rept. no. NAMC-AML-AE 4195; Pt. 2; AD-217 102.
Order from LC mi$2.70, ph$4.80 PB 149 655

The X2020 aluminum alloy is thermally stable up to 250°F. The alloy exhibits satisfactory resistance welding characteristics; however, considerable difficulty was experienced in fusion welding the alloy by the conventional heli-arc process. The alloy appears to be susceptible to intergranular corrosion when a delay quench time of 10 seconds is exceeded. The alloy is more compatible with magnesium in corrosive media than either 2024 or 7075 aluminum alloys.

Battelle Memorial Inst., Columbus, Ohio.
NOTCH SENSITIVITY OF REFRACTORY METALS, by Albert G. Imgram, Frank C. Holden and others. Rept. for 1 May 59-13 Mar 60 on Materials Application, Contract AF 33(616)6291. Sep 60, 115p. 18 refs. WADD Technical rept. 60-278.
Order from OTS $2.50 PB 171 198

The tensile and notch tensile properties of four refractory metals, molybdenum, tungsten, columbium, and tantalum, and one alloy, Mo-0.5Ti, were investigated at five temperatures selected to encompass the brittle-to-ductile transition. All specimen failures were classified according to fracture mechanism. The notch sensitivity of each material was evaluated by analyzing the notch and unnotch tensile strength, the ductility transition, and the fracture transition. (Author)

Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio.
PRODUCTION AND AVAILABILITY OF SOME HIGH-PURITY METALS, by E. M. Sherwood and V. S. Secrest. [Rept. on Contract AF 18(600)1375].
2 Dec 60, 48p. 109 refs. DMIC memo. 76.
Order from OTS $0.50 PB 161 226

The preparation of metals of the highest purity requires the combined use of a number of specialized techniques. Among the more important processing steps, purification of halide compounds of metals and their decomposition or reduction under carefully controlled conditions, vacuum melting by arcs or electron bombardment for consolidation, and final purification by zone refining are potentially of the greatest utility. Many improvements in these techniques are possible, and further refinements in analytical methods will be required to evaluate high-purity metals of the future. Electron-bombardment melting and zone-refining equipment are the only types of general utility in the preparation of high purity metals. The chemical processing equipment used is custom built and varies widely with the process involved.

Illinois U., Urbana.
PROTECTIVE COATINGS FOR REFRACTORY METALS, by Clifton G. Bergeron, Victor J. Tennery and others. Rept. for Sep 59-June 60 on Ceramic and Cermet Materials, Contract AF 33(616)5734. Aug 60, 54p. 1 ref. WADC Technical rept. 59-526, Part II.
Order from OTS $1.50 PB 171 193

Various ceramic coating systems for tungsten metal were developed and evaluated. These included silicide coatings, ceramic crystals in a glass matrix, zirconia-clad coatings, vapor-deposited SiO, and recrystallizing glasses. The system considered protective for tungsten at temperatures of 3000°F or higher, from a practical viewpoint, was a coating consisting of 35% glass and 65% zircon. Tungsten wire specimens coated with this glass-zircon coating were protected for ten hours at 3000°F. A study of the nature of the degradation of this coating tested at 3000°F as a function of time was carried out based on microstructural observations and X-ray diffraction analysis of the reaction products. (Author)

Metals and Ceramics Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
THE PRESENT STATUS OF RUSSIAN METALLURGY, by George D. Haley. Rept. on Metallic Materials.
Sep 60, 13p. 19 refs. WADD Technical note 60-197.
Order from OTS $0.50 PB 171 307

Western observers, through recent visits to the Soviet Union and by reviewing the increasing number of Russ Russian technical publications, have indicated surprise at the present advanced status of Soviet Metallurgy. Russian advanced metallurgical technology has been due to the socialization of this science. The government has channeled vast resources, personnel, and facilities into metallurgical research with the result that in some areas Russian technology is superior to that of the United States. Some forty-five thousand Soviet students were enrolled in metallurgical curricula in 1958, and in this year alone forty-five hundred well-trained graduates entered industry. Many institutions are now conducting vast research programs in very modern and extensive facilities. The results of the Russian efforts in this field have been outstanding and greater progress is expected; however, the price has been tremendous in terms of funds, manpower, and effort. (Author)

Ferrous Metals

Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio.
AVAILABILITY AND MECHANICAL PROPERTIES OF HIGH-STRENGTH STEEL EXTRUSIONS, by R. J. Fiorentino and A. M. Sabroff. Rept. on Contract AF 18(600)1375. 26 Oct 60, 63p. 7 refs. DMIC rept. 138.
Order from OTS $1.75 PB 151 097

Information on the availability and mechanical properties of high-strength steel extrusions is compiled. Six classifications of high-strength steels are considered. Typical current extrusion specifications are discussed, and illustrative mechanical properties are reported. Some attention is devoted to anticipated future consumer requirements. (Author)

Watertown Arsenal Labs., Mass.
TOUGHNESS OF STEEL SHEET: THE ADVANTAGE OF LAMINATING, by S. V. Arnold. Oct 60, 24p. 3 refs. Technical rept. no. WAL TR 834.21/2.
Order from OTS $0.75 PB 171 044

Impact tests of simulated sheet prepared in various gages by machining and grinding AISI 4340 steel bar stock quenched and tempered to 210,000 psi and 165,000 psi tensile strength values were conducted to show the relation of impact energy to temperature, gage and strength level. The data demonstrate a behavior pattern whereby sheet of appropriate gage and strength may be selected to assure ductile fracture in tearing under impact loads. This pattern also defines the advantages to be realized over certain temperature ranges by laminating, i.e., using two or more thinner sheets in place of a single sheet of the same aggregate thickness. (Author)

Structural Metallurgy and Corrosion

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia.
EVALUATION OF HIGH STRENGTH-HIGH TEMPERATURE ALUMINUM CASTING ALLOYS C355-T61 AND XA-140-F, by R. G. Mahorter, Jr. and W. F. Emmons. Final rept. on Bureau of Aeronautics Proj. TED NAM AE 4177. 6 July 59, 37p. 4 refs. Rept. no. NAMC-AML-AE 1096.
Order from LC mi$3.00, ph$6.30 PB 152 463

Aluminum casting alloy C355-T61 was evaluated with respect to tensile properties and found to be superior to 355-T51, A355-T51, and 142-T77 for temperatures up to 500°F and for times up to 100 hours. Another casting alloy, XA140-F, was evaluated with respect to tensile, fatigue and creep properties. Tensile properties in the 400°F to 600°F range were found to be outstanding when compared to other aluminum casting alloys. The loss of strength on long exposure to temperature was small. Creep properties appear promising for a cast aluminum alloy. (Author)

Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio.
NOTES ON LARGE-SIZE FURNACES FOR HEAT TREATING METAL ASSEMBLIES, by H. J. Hucek, A. R. Elsea, and A. M. Hall. [Rept. on Contract AF 18(600)1375]. 25 Aug 60, 9p. 5 refs. DMIC memo. 63; AD-242 530.
Order from OTS $0.50 PB 161 213

The bottom-open gantry furnace using an endothermic protective atmosphere is the most frequent type of installation for these large furnaces. This type of furnace allows loading from or quenching into a pit below the furnace without losing the protective atmosphere or exposing the part to the air. Also, holding the parts to be heat treated in a vertical position assists in reducing distortion during heat treatment. The endothermic protective atmosphere is the most popular because it is easy to control the carbon potential with this gas by regulating the dew point. The dew point in the furnace can be readily varied by regulating the mixture in the generator and the flow of atmosphere through the furnace. The regulation of the carbon potential of the furnace atmosphere is extremely important in heat treating parts which require close control or elimination of decarburization. An atmosphere which would be neutral to a 0.30 carbon steel could very readily decarburize a 0.40 carbon steel. (Author)

General Electric Research Lab., Schenectady, N. Y.
RESEARCH AND DEVELOPMENT ON THE EFFECTS OF HIGH PRESSURE AND TEMPERATURE ON VARIOUS ELEMENTS AND BINARY ALLOYS, by J. S. Kasper, J. E. Hilliard and others. Rept. for June 58-Oct 59 on Metallic Materials, Contract AF 33(616)5995. July 60, 71p. 33 refs. WADC Technical rept. 59-747; AD-244 767.
Order from OTS $2.00 PB 171 348

An investigation has been made of the effect of pressure on the properties and kinetics of transformation in various alloy systems. Many of the experiments were exploratory and yielded no evidence for irreversible changes with pressures of up to 100,000 atm at elevated temperatures. However, a shift was observed in the gamma loop of the iron-chromium system from 12.5 to about 20 per cent chromium. Evidence for a similar shift in the gamma loop of the iron-aluminum system was also found. Pressure heat treatment of a tool steel gave a refinement of the austenite grain size and an improvement in the distribution of carbides. An apparatus for x-ray diffraction analysis at pressures up to 35,000 atm has been constructed, and observations have been made on the bismuth I to II transition. In the kinetic experiments it has been found that pressure markedly decreases the transformation rate of austenite to pearlite and the precipitation rate in the systems: aluminum-copper, copper-beryllium, lead-tin, and gold-nickel. (Author)

Institute of Research, Lehigh U., Bethlehem, Pa.
PLASTIC DEFORMATION AND FRACTURE OF METALS AT HIGH RATES OF STRAIN, by C. W. Curtis. Status rept. no. 1, 28 Aug-30 Nov 54, on Contract DA 36-034-ORD-1456, Sup. no. 1. [1954] 9p. 6 refs. AD-53 055.
Order from LC mi$1.80, ph$1.80 PB 153 882
This report released for sale to the public 19 Jan 61.

Effect of a tapered cylindrical section on the behavior of an elastic strain pulse: The feasibility of changing the magnitude and shape of an elastic pulse by channeling it from one uniform section of a bar to another having a different cross-sectional area is being determined. By using colliding bars, the transmission through a discontinuous change in cross section was effective in altering the magnitude but not the shape of the incident pulse. Preliminary results indicate that if the change is made gradually by means of a taper, the shape as well as the magnitude of the pulse is altered during transmission. Propagation of plastic strain in a lead bar: Measurements were conducted to determine whether rate of strain is an important factor in the propagation of plastic strain in lead. Dispersion of a longitudinal strain pulse in an elastic bar: Equipment is being constructed by using $BaTiO_3$ rather than resistance strain gages to study the oscillations produced in a long bar by reflection of an air shock from one end. Reflection of a strain pulse from a free boundary: Investigations are being made of a method in which a resistance strain gage is embedded in a block of lucite.

Naval [Weapons Plant] Washington, D. C.
METALLIC MIRRORS FOR MIRROR DECK LANDING SIGHT SYSTEM; FEASIBILITY OF MANUFACTURING, by P. H. Austin and Wm. Lurie. 28 Apr 59, 33p. 23 refs. NGF-T-6-59; NAVORD rept. 6495; AD-216 736.
Order from LC mi$3.00, ph$6.30 PB 149 739

An investigation was made of the mechanical, optical, and salt-spray corrosion-resistant properties of sheets of 61 ST-6 Aluminum Alloy, Clad Aluminum Reflector Metal, Haynes Alloy No. 25 (a cobalt-base alloy), and Type 316 Stainless Steel, together with several inorganic protective coatings on the mirrors, to determine the feasibility of polishing and forming them into metallic mirrors having a 90-inch radius cylindrical curvature, satisfactory reflective quality, and smooth surface contour. The aluminum materials were badly pitted by the cyclic salt-spray corrosion test. Haynes Alloy No. 25 and Type 316 Stainless Steel polished to a reflectance value of 65 and 72 percent, respectively; both successfully passed the salt-spray corrosion test; however, after polishing, both were difficult to form into the required curvature and still maintain satisfactory surface contours.

Nitrogen Div., Allied Chemical Corp., Hopewell, Va
NITROGEN TETROXIDE CORROSION STUDIES, by C. W. Alley, A. W. Hayford, and H. F. Scott, Jr. Rept. for June 59-June 60 on Finishes and Materials Preservation, Contract AF 33(616)6568. July 60, 64p. WADD Technical rept. 60-384.
Order from OTS $1.75 PB 171 301

The corrosion rates of carbon steel, stainless steel (304-L and PH15-7 Mo), aluminum (5086), and titanium (75A and 6Al-4V) in dry and wet nitrogen tetroxide were determined under static conditions of exposure at -9°C to 74°C. Carbon steel and aluminum were attacked in proportion to water concentration and temperature. Stainless steel 304-L and titanium were unattacked, and PH 15-7 Mo only slightly attacked. Corrosion by dry nitrogen tetroxide under flow conditions was negligible. Telflon was found to contribute to corrosion of stainless steel and carbon steel under certain conditions. (Author)

Northwestern U., Evanston, Ill.
ON THE INTERNAL FRICTION OF COLD WORKED AND QUENCHED MARTENSITIC IRON AND STEEL, by T. Mura, J. O. Brittain, and I. Tamura (Osaka U.). Rept. on Contract AF 18(600)1598. 6 Sep 60, 19p. 18 refs. AFOSR TN-60-1121; AD-245 089.
Order from LC mi$2.40, ph$3.30 PB 152 691

A theoretical explanation is given for the internal friction peaks which are observed at 200°C ~ 250°C for cold worked iron and steels and for steels in the martensitic condition. The theory for the peaks is based upon the addition of a term to the free energy in order to account for the strain energy due to the interaction of an atmosphere and the line imperfections. The linear standard solid was obtained from the model in which dislocations are vibrating with an atmosphere of carbide precipitates.

Westinghouse Research Labs., Pittsburgh, Pa.
STRESS CORROSION CRACKING, by D. van Rooyen. Technical rept. no. 2 on Contract Nonr-2868(00). 19 Jan 60. 10p. 13 refs. AD-236 255.
Order from LC mi$1.80, ph$1.80 PB 152 880

Nickel, even when stressed above its yield point, does not crack in boiling 42% magnesium chloride solution. Tests were made with compound specimens, consisting of nickel bonded to stainless steel which is susceptible to cracking under the test conditions. Cracks initiated in, and propagated through, the steel stopped when reaching the nickel boundary.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

California U., Berkeley.
NUCLEAR INTERACTIONS IN CARBON PRODUCED BY COSMIC RAYS WITH ENERGIES BETWEEN 10^{10} AND 10^{12} ev, by Luisa F. Hansen and W. B. Fretter. Technical rept. nos. 45-46 on Contract Nonr-222(40). Jan 60, 49p. 37 refs. AD-231 430.
Order from LC mi$3.30, ph$7.80 PB 152 916

High energy nuclear interactions in the range of energies 10^{10} - 10^{12}ev were analyzed by means of a cloud chamber in a magnetic field. Measurements of ionization and momentum made possible the identification of electrons and π-mesons to about 20 Bev/c. The primary particles were cosmic-ray nucleons and a possible fraction of pions, the target nuclei were carbon and the velocities of the primaries were determined from balance of momentum in the center of mass system. A total of 41 events were analyzed, and the results compared to previous experimental work.
Included in the report is:
Observations of solar flare radiation at high latitude during the period July 10-17, 1959, Technical rept. no. 46, pub. in Physical Review Letters 3:390-392, 15 Oct 59.

Naval Radiological Defense Lab., San Francisco, Calif.
SOIL ANALYSIS BY NEUTRON ACTIVATION, by F. M. To novec. 28 Jan 60, 10p. 4 refs. Research and development technical rept. USNRDL-TR-396; AD-234 743.
Order from LC m. .80, ph$1.80 PB 153 071

The use of the neutron activation method of soil analysis is discussed. Data are presented which show the results of the analysis of various soils. The analysis indicates a large variation in chemical content can occur in adjacent areas. Where interest exists only in the gamma-ray emitting elements produced when the soil is exposed to neutrons, this method is a rapid and inexpensive means of soil analysis. (Author)

Rock Island Arsenal Lab., Ill.
POLYMERIZATION OF STYRENE AND BUTADIENE BY GAMMA RADIATION, by Stanley L. Eisler. 31 Aug 60, 13p. 5 refs. Rept. no. 60-2562.
Order from OTS $0.50 PB 171 041

Conversion rates of styrene and butadiene monomers to their polymers, when exposed to gamma radiation, are reported, as are the molecular weights of the resultant polymers. It was found in each case that both the conversion rates and the molecular weights decrease as the dose rate increases. The irradiation of solutions of styrene in benzene provided similar results and in addition showed that concentration had no appreciable effect on conversion rate, but that a decrease in concentration produced a decrease in molecular weight. (Author)

Washington U., St. Louis, Mo.
THE CLOUD CHAMBER STUDY OF THE UNSTABLE PARTICLES PRODUCED IN NUCLEAR INTERACTIONS OF THE COSMIC RADIATION AT MOUNTAIN ALTITUDE, by Medford Sherman Webster. Doctoral thesis. Technical rept. no. 3 on Cosmic Rays, Contract Nonr-816(09). July 59, 141p. 61 refs. AD-225 104.
Order from LC mi$7.20, ph$22.80 PB 149 736

Contents:
Apparatus
  Location of equipment
  Description of the cloud chambers
  Triggering system
  Cameras and photography
The geometry of cloud chamber measurements
  The viewing tables and apparatus
  Determination of the space coordinates of a point
  Direction cosines of line segments
  Projected scattering angles
The physics of cloud chamber measurements
  Range
  Ionization in the drop-count and multiplate chambers
  Scattering in the plates and gas of the chamber
Events
  The scanning procedure
  π-μ-decay in the gas
  Charged V-decays
  Neutral V-decays
  Heavy meson decays at rest
An anomalous event
The decay of a stopped light meson
Properties of the established particles
Scattering with energy loss in the plate
The scattering in the gas of a 0.27-Mev electron

Washington U., St. Louis, Mo.
THE POLARIZATION OF COSMIC RAY MUONS AT SEA LEVEL, by Clarence Scott Johnson. Doctoral thesis. Technical rept. no. 4 on Cosmic Rays, Contract Nonr-816(09). July 59, 93p. 31 refs. AD-220 531.
Order from LC mi$5.40, ph$15.30 PB 149 737

The partial polarization of positive muons within a narrow range of velocities is studied. The partial polarization of cosmic ray muons depends upon the shape of the parent pion energy spectrum. Measurement of the polarization at sea level is a method of obtaining this spectrum. The polarization was measured by stopping the muons in a copper absorber, in which their polarization is largely preserved, and observing the asymmetry of the muon decay electrons, which is interpreted according to the 2-component theory of the neutrino [Phys. Rev. 105:1671, 1957]. The experimental results indicate that the positive muon beam stopping in a thin absorber at sea level, is partially longitudinally polarized. On the basis of the 2-component theory, the magnitude of this partial polarization is found to be greater than $21 \pm 3\%$. Assuming a power law for the parent pion differential energy spectrum, the slope of this curve is found to be greater than 1.3 ± 0.3. In the absence of external magnetic fields, copper deplorizes stopped muons at a rate corresponding to a relaxation time of several μsec. The polarization at sea level with $\gamma = 2.5$ is 0.32, while with $K_{abs} = 0.7$ the experimental result becomes 0.30.

Elementary Particles

Maryland U., College Park.
FINAL STATE INTERACTIONS AND $|\Delta I| = 1/2$ RULE, by K. Chadan and S. Oneda. Rept. on Contract AF 49(638)24. Mar 60, 6p. 5 refs. Dept. of Physics Technical rept. no. 168; AFOSR-TN-60-303; AD-235 033.
Order from LC mi$1.80, ph$1.80 PB 149 733

Maryland U., College Park.
K^--DEUTERON SCATTERING AND THE K^--NUCLEON SCATTERING LENGTHS, by T. B. Day, G. A. Snow, and J. Sucher. Rept. on Contracts AF 49(638)24 and AT(40-1)2504. Mar 60, 8p. 12 refs. Dept. of Physics Technical rept. no. 167; AFOSR-TN-60-354; AD-234 684.
Order from LC mi$1.80, ph$1.80 PB 149 732

Maryland U., College Park,
LIFETIMES OF GEOMAGNETICALLY TRAPPED PARTICLES DETERMINED BY COULOMB SCATTERING, by Robert C. Wentworth. Doctoral thesis. Rept. on Contract AF 49(638)530. 1960, 108p. 70 refs. AFOSR TN-60-288; AD-235 186.
Order from LC mi$5.70, ph$16.80 PB 149 650

Some aspects of the lifetimes to be expected for trapped fast particles, protons and electrons, in the earth's magnetic field are investigated. The scattering process was considered in detail for these particles as well as the energy loss mechanism. The lifetimes determined by these mechanisms range from minutes to many years depending on the particles scattered, their energies, and their distance from the earth. These calculations included only the scattering from the ionized component of the earth's outer atmosphere, although scattering from the neutral component can be added. The problem of pure energy loss with scattering neglected was easy to solve. The problem of pure scattering with no energy loss is more difficult. The conclusion drawn from the analysis of this problem is that the trapped particles random walk in their equatorial pitch angles as if they were always moving in a constant uniform density of scattering centers equal to one half of the equatorial density. Although the density of scattering centers is much greater near the trapped particles reflection point, the effect of scattering is much less than equatorial plane scattering. These two opposing effects roughly cancel.

Syracuse U., N. Y.
THE ENERGY DISTRIBUTION OF ELECTRONS FROM IONIZING COLLISIONS OF HEAVY PARTICLES, by H. W. Berry. Rept. for 1 June 58-31 Aug 60 on Contract AF 33(616)5741. Sep 60, 59p. 14 refs. ARL Technical note 60-144; AD-245 856.
Order from OTS $1.50 PB 171 335

The energy distribution of electrons from ionizing collisions of ions and fast neutral atoms or molecules with those of the parent gas has been measured for A, He, N_2, and H_2. The energy of the incident particles ranged from 0.30 to 3.0 kev. The electron distributions exhibit an initial rapid decrease followed by maxima or plateaus for A and He. For N_2 and H_2 the yields decrease nearly logarithmically. (Author)

Washington U., St. Louis, Mo.
INTERACTIONS OF FAST μ-MESONS IN LEAD WITH SMALL ENERGY TRANSFER, by J. dePagter (Doctoral thesis) and R. D. Sard. Technical rept. no. 5 on Cosmic Rays, Contract Nonr-816(09). Jan 60, 48p. 26 refs. AD-233 706.
Order from LC mi$3.30, ph$7.80 PB 152 911

With the Pb target material divided into 1.27 cm slabs between hodoscoped Geiger tubes and surmounted by a magnet cloud chamber, a study was made of the interactions of fast μ-mesons in which at least one evaporation neutron is produced and no additional charged particles emerge from the slab. The cross section average neutron multiplicity, α_m, is $(15.2 \pm 2.1) \times 10^{-29}$ cm^2 per nucleon.

Instruments and Installations

Dublin Inst. for Advanced Studies (Eire).
INTRINSIC CALIBRATION OF THE PHOTO-ELECTRIC CONDENSATION NUCLEUS COUNTER MODEL 1957 WITH CONVERGENT LIGHT-BEAM, by L. W. Pollak and A. L. Metnieks. Technical (scientific) note no. 9 on Contract AF 61(052)26. 1960, 61p. 10 refs. AFCRL-TN-60-637.
Order from LC mi$3.90, ph$10.80 PB 152 768

The intrinsic calibration of the photo-electric condensation nucleus counter Model 1957 with convergent light-beam is based on a so-called 'e, E curve', where E denotes the extinction for the concentration Z and e that for the concentration Z/2·18. The e, E curve is within reasonable limits independent of the particular photo-electric counter Model 1957, the alignment and type of the light-pencil whether divergent or convergent, the size of the diaphragm directly above the photo-cell and the speed of producing the over-pressure with filtered air. The dilution ratio, however, for which the e, E curve is valid, must be accurately known. The ratio between any two concentrations read off from the intrinsic calibration curve or calibration table based on the e, E curve is also independent of the instrumental specification and of the absolute values taken as basis for the calibration. The absolute values of the calibration curve or table, of course, depend on the factors mentioned. A convergent light-beam has been used for this calibration and is strongly recommended in order to prevent 'scintillation' with very low concentrations and to ensure long-term agreement between counters of identical construction. (Author)

Lockheed Aircraft Corp., Marietta, Ga.
NEUTRON AND GAMMA FLUX MAPPING AT THE RADIATION EFFECTS FACILITY, by R. L. Gamble, J. K. Grant and others. Rept. on Contract AF 33(600)38947. Sep 59, 167p. 5 refs. Nuclear rept. 60; AD-228 483.
Order from LC mi$7.80, ph$25.80 PB 153 790

This report released for sale to the public 19 Jan 61.

The 2200 m/sec neutron flux per watt of reactor power (neutrons/cm^2 sec watt), the fast neutron dose rate per watt (rads/hr watt in ethylene), and the gamma ray dose rate per watt (ergs/gm sec watt in carbon) were measured in the irradiation volumes around the radiation effects reactor for several shield tank configurations. Curves are given from which these quantities can be obtained as a function of distance from the reactor. A complete description is given of the instrumentation and techniques used in making these measurements as well as the theory behind the techniques. (Author)

Naval Radiological Defense Lab., San Francisco, Calif.
THE MODIFICATION AND CALIBRATION OF LANDSVERK MODEL L-62 CHARGER-READERS FOR INTERCHANGEABILITY, by R. L. Lynn. 28 Mar 60, 22p. 2 refs. Research and development technical rept. USNRDL-TR-408; AD-236 817.
Order from LC mi$2.70, ph$4.80 PB 153 622

This report released for sale to the public 16 Jan 61.

Landsverk Model L-62 charger-readers and their calibration procedure were modified so that Landsverk pocket chambers can be charged on any of the charger-readers and subsequently read on any other of the charger-readers without introducing significant error in the dose reading. The modifications were primarily concerned with the establishment of an equal, constant value, charging voltage for all the pocket chambers. The introduction of an offset zero position for reading Landsverk Model L-65, 200-mr pocket chambers, to

compensate for the negative readings of fully charged 200-mr pocket chambers was also accomplished. With the modified L-62 charger-readers, a constant value of applied voltage on a pocket chamber will yield dose readings reproducible to better than 5 percent for consecutive readings made on different charger-readers. This value is compared with a discrepancy of about 15 percent for similar readings on unmodified L-62 charger-readers. A precision of 1 percent can be realized for consecutive readings made on any one modified charger-reader. (Author)

Naval Radiological Defense Lab., San Francisco, Calif.
A NINE-CHANNEL TIME ANALYZER FOR MEASURING SHORT HALF-LIFE ACTIVITIES IN THE MILLISECOND REGION, by R. A. Taylor. 19 Sep 56, 11p. 4 refs. Research and development technical rept. USNRDL-TR-111.
Order from LC mi$2.40, ph$3.30 PB 153 621

This report released for sale to the public 10 Jan 61.

A nine-channel time analyzer has been constructed and used to measure radiations from radioactive isotopes whose half lives are of the order of magnitude of a few milliseconds. It is operated in association with a Van de Graaff generator, the beam of which is pulsed. (Author)

Radioactivity

Air Force Special Weapons Center, Kirtland AFB, N. Mex.
THE FEASIBILITY OF USING REMOTELY CONTROLLED VEHICLES TO DECONTAMINATE LARGE PAVED AREAS, by Clayton L. Schlemm and Alexander E. Anthony, Jr. Oct 60, 88p. 8 refs. AFSWC TN-60-25 AD-245 017.
Order from LC mi$4.80, ph$13.80 PB 152 698

Studies were performed to determine the feasibility of using a remotely controlled vehicle to sweep and remove radioactive debris from large paved areas. Test data were collected for comparison of the remote operation and manual operation of the vehicle. The test parameters included comparison of (1) decontamination efficiency, (2) time needed for decontamination, and (3) sweeping patterns. A comparison of test parameters has indicated that it is feasible to use a remotely controlled sweeper to decontaminate an area. Approximately the same decontamination efficiencies were obtained under remote and manual operation (approximately 99.7 percent). The operating time for remote decontamination was about twice that for manual. This time can be reduced as the area to be swept becomes larger and the operator becomes more proficient. These results were obtained on a small area (approximately 3,000 square feet). The time lost was mostly in turning around and reorienting the vehicle at the end of each sweeping pass on the contaminated area. The driving patterns were quite different. Under manual operation, the vehicle is easily controlled and no sweeping overlap is necessary. Under remote operation, there was a tendency for the vehicle to drift. The operator, attempting to correct this, had a tendency to oversteer, which resulted in more sweeping passes than were necessary. Refinement of the remote steering mechanism would correct this discrepancy. (Author)

Defense Atomic Support Agency, Washington, D. C.
GAMMA SPECTRA OF URANIUM-238 FISSION PRODUCTS AT VARIOUS TIMES AFTER FISSION, by P. J. Dolan. May 59, 50p. 5 refs. DASA 526.
Order from LC mi$3.30, ph$7.80 PB 153 030

Calculated gamma spectra produced by Uranium-238 fission are tabulated for various times after fission. Similar tabulations are given omitting certain volatiles and portions of their daughter products. The tabulated data are also presented in graphical form. (Author)

Human Sciences Research, Inc., Arlington, Va.
AN INVENTORY OF SELECTED SOURCE MATERIALS RELEVANT TO INTEGRATION OF PHYSICAL AND SOCIAL EFFECTS OF AIR ATTACK, by Robert D. Popper and William A. Lybrand. Technical note on Contract AF 49(638)549. Oct 60, 518p. 191 refs. HSR-RR-60/4-SE; AFOSR-TN-60-379; AD-244 888.
Order from LC mi$11.10, ph$78.90 PB 152 821

The inventory is divided into three major sections: (1) the problem includes studies or treatises dealing with thermonuclear warfare and its effects; (2) societal behavior under stress encompasses studies of World War II bombing attack effects, the effects of major disasters on societal functioning, and studies of individual and small group reactions to stress; and (3) analytic methods contains reports of analytic approaches used on aspects of the problem, or on similar problems, and a number of applications of analytic models which seem to yield insights into the usefulness of those types of models to the present research program. (Author)

Massachusetts Inst. of Tech., Cambridge, Mass.
APPLICATION OF WEATHER RADAR TO FALLOUT PREDICTION, by Pauline M. Austin. Quarterly technical rept. no. 9, 1 Mar-31 May 60, on Contract DA 36-039-sc-75030. 15 June 60, 11p. AD-241 914.
Order from LC mi$2.40, ph$3.30 PB 152 661

The application of radar to the prediction of radioactive rainout resulting from a nuclear detonation is investigated. The computational program for the effect of rain on the fallout pattern for a selected wind field and initial distribution of radioactivity is ready to be tested with the addition of the final step, that of inserting a standard shower in the region downwind of the detonation. The programs for the first and second steps, computing the trajectories of radioactive wafers and summing at the ground, were completed and tested. The accuracy of quantitative radar measurements for both single and volume targets was studied, with particular effort directed towards the problems involved with volume targets. A number of drop-size distributions were taken simultaneously with rain gauge and radar data, and their effect on the signal was verified. Consideration is being given to the effect of the finite dimensions of the radar beam and the rain showers.

Naval Radiological Defense Lab., San Francisco, Calif.
APPLICATION OF "THEORY FOR CLOSE-IN FALLOUT" TO LOW-YIELD LAND SURFACE AND UNDERGROUND NUCLEAR DETONATIONS, by A. D. Anderson. 12 Jan 59, 61p. 10 refs. Research and development technical rept. USNRDL-TR-289; AD-234 359.
Order from LC mi$3.90, ph$10.80 PB 153 070

A fallout-prediction method should be based on all the dynamics of the fallout process, but current prediction models do not provide more than generalized answers because they do not account for early-time dynamics. A Theory for Close-in Fallout has been derived in a recent attempt to account for the entire process. In this study, the new theory is checked by developing a mathematical fallout-prediction model from it (the D model). This model is used to predict fallout patterns from 3 low-yield (about 1 KT nuclear weapons detonated in Nevada. These patterns are then compared with the measured test patterns and also with patterns calculated with 2 other prediction models. Based on these comparisons, it is concluded that the theory is valid, at least for low-yield land-surface and shallow-underground bursts. For underground bursts having a significant base surge, it is indicated that the D model will have to be modified to take this effect into account before successful prediction can be expected. (Author)

Naval Radiological Defense Lab., San Francisco, Calif.
INVESTIGATION AND CORRELATION OF SOME PHYSICAL PARAMETERS OF FALLOUT MATERIAL, by W. Williamson, Jr. 28 Mar 57, 34p. 2 refs. Research and development technical rept. USNRDL-TR-152; AD-144 368.
Order from LC mi$3.00, ph$6.30 PB 153 068

This report released for sale to the public 6 Jan 61.

An attempt has been made to correlate some of the fundamental physical parameters of fallout material. Parameters discussed are color and shape, activity, size, weight, and density. The investigation revealed a significant difference in density and activity in different types of fallout. (Author)

Naval Radiological Defense Lab., San Francisco, Calif.
STATUS OF RADIOLOGICALLY PROTECTIVE COATINGS FOR LAND TARGET SURFACES, by W. L. Owen. 13 Nov 58, 50p. 10 refs. Research and development technical rept. USNRDL-TR-277; AD-233 575.
Order from LC mi$3.30, ph$7.80 PB 153 570

This report released for sale to the public 4 Jan 61.

It is the purpose of this survey to examine the available test results and determine the status of protective coatings as applied to land target surfaces. The survey covered tests involving approximately 30 coating-surface combinations made up of approximately 20 coatings and 12 surfaces. These combinations each had been subjected to at least one of three types of contaminant (dry, slurry and wet) and one of six separate decontamination procedures. Results from these tests revealed only nine coatings exhibiting the capability to appreciably improve decontamination effectiveness of specific surfaces. With the exception of Navy 5H paint, this capability was limited to the protection of asphalt paving, concrete paving and wood sliding. Navy 5H paint consistently provided substantial gains in the effectiveness achieved on five different wall materials. In general, it was noted that gains attributed to coatings in most cases could have been duplicated or surpassed by the use of a more stringent decontamination procedure on an unprotected surface. (Author)

Technical Research Group, Inc., Syosset, N. Y.
THE TRANSMISSION MATRIX METHOD FOR PENETRATION PROBLEMS, by David Yarmush, Julius Zell, and Raphael Aronson. Final rept. for Dec 58-Nov 59 on Contract AF 33(616)6081; Continuation of Contract AF 33(616)3616. Aug 60, 299p. 5 refs. WADC TR-59-772.
Order from OTS $4.00 PB 171 341

A practical machine method for computing transmission and reflection of radiation by laminated slab shields is described, making use of transmission and reflection matrices. These are combined in a way which produces a formal solution of the Boltzmann equation in slab geometry. This result is applied by using representations in terms of energy groups and angular expansions. Two codes for the IBM-704 which together carry out the computation of the transmission and reflection matrices are described and operating instructions are given. Numerical results for gamma rays are presented. The advantages of the transmission matrix method as compared to other methods are discussed. Appendices are included showing how in the P_1 approximation the method gives diffusion theory in a particularly simple way and how it can be applied to other geometries. (Author)

PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT

Arctic Aeromedical Lab., Ladd AFB, Alaska.
ARCTIC SURVIVAL KIT, PASSENGER, by Volney M. Williams. Aug 57, 29p. Technical rept. 57-3.
Order from LC mi$2.70, ph$4.80 PB 153 346

This report concerns a newly developed survival item that will provide passengers utilizing cargo-type aircraft with a survival kit, which is immediately available to them, should bail out in the Arctic be necessary. At the present time, passenger bail out is not feasible in Alaska due to the probable inaccessibility of the cargo survival bundles after para-descent. The standardization of the Arctic Survival Kit, Passenger will provide the individuals of the Alaskan Air Command with readily available survival equipment of the type that would be required by them, and which is considered to be an improvement over the present cargo aircraft survival kit. (Author)

Quartermaster Field Evaluation Agency, Fort Lee, Va.
THE CONSTRUCTION OF INTERVAL SCALES FOR MEASURING THE ACCEPTABILITY OF CLOTHING AND EQUIPMENT IN FIELD TESTS, by Lee E. Paul. Jan 60, 61p. 6 refs. Technical rept. R-4; FEA MRS 5901; AD-231 043.
Order from LC mi$3.90, ph$10.80 PB 149 688

The purpose of this research study was to establish valid and reliable rating scales that are simple to administer, easy to score, and conform to psychological and statistical principles which will permit the determination of exact interpretation of test subject responses. The research study indicated that the 9-point scales are more reliable than the 6-point scales and provide more information on the items rated. The 6-point scales, however, can be used under certain conditions, i.e., where time is an important factor or where only a rough measure is needed. The specific scales seem more sensitive to differences between similar items and less subject to halo effect than general scales. In general, attitude towards the Army has little effect on item ratings. (Author)

PHYSICS

Armour Research Foundation, Chicago, Ill.
CONVERSION OF DIFFRACTOMETER FOR SMALL ANGLE SCATTERING, by Robert H. Bragg and L. E. Copeland (Portland Cement Association). Rept. on Contract AF 49(638)829. 1 Oct 60, 30p. 13 refs. AFOSR-TN-60-1235; AD-245 197.
Order from LC mi$2.70, ph$4.80 PB 152 730

A simple, rapid conversion of a diffractometer from conventional diffractometry to small angle scattering is described. The conversion consists of adding an attachment which provides a much larger separation than is usual between the slits limiting the angular divergence of the beam scattered by the sample which reaches the detector. Usable measurements can be made down to 0.10^{o} 2 θ The attachment is inexpensive to construct and can be installed and aligned in about 30 minutes. Sample preparation requires only a few minutes and both solids and liquids are handled with equal facility. Intensity data are obtained by means of manual fixed count measurements and a complete pattern for most materials can be obtained in about one hour. The range of intensity encountered in materials e.g., Magnesite, colloidal graphite, silica gel, and silica sols can be as great as 10^{4} : 1. This makes possible comparison of the experimental curves with theory for both small and large values of the scattering vector. (Author)

Bureau of Naval Weapons, Washington, D. C.
MASS IN AIR 1 GRAM TO 30 KILOGRAMS DIRECT WEIGHING METHOD. BuWeps-BuShips Calibration Program. 8 June 60, 20p. Secondary Standards Lab. Measurement System Operation Procedure NM-03.
Order from OTS $0.50 PB 171 202

This procedure describes the operation of a secondary standards laboratory calibration system which is used to calibrate Class T and lesser accuracy weights by the direct weighing method.

J. G. Engineering Research Associates, Baltimore, Md.
VIBRATIONS OF A THICK WALLED ELASTIC CYLINDER: A COMPARISON OF THE EXACT THEORY WITH APPROXIMATE THEORIES, by Joshua E. Greenspon. Technical rept. no. 2 on Contract Nonr-2733(00). July 59, 21p. 24 refs. AD-220 099.
Order from LC mi$2.70, ph$4.80 PB 149 682

Vibrations of an elastic cylinder as predicted by a number of the approximate shell theories are compared with the results of the exact theory. The membrane theory of shells is rather accurate for predicting frequencies and displacement rations of cylinders with appreciable thickness. The theories which include rotatory inertia and shear are accurate over most of the wave length spectrum of the lowest branch. For the very thick shell (with $\frac{\text{inside radius}}{\text{outside radius}} = 0.5$) only the exact theory shows the full characteristics of the displacement distribution. (Author)

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
PROGRESS REPORT NO. XXV, Rept. on Contracts Nonr-1841(10), Nonr-1841(50), AT(30-1)1937, AF 19(604)5482 and AF 33(616)5920. July 59, 86p. 54 refs. AD-225 055.
Order from LC mi$4.80, ph$13.80 PB 149 728

Contents:
Conduction and breakdown
Dielectric spectroscopy
Chemistry
Structure analysis
Single crystals
Ceramics
Magnetics
Magnetic resonance and magneto-optics
(See also PB 144 445)

Electricity and Magnetism

California U., Berkeley.
MATHEMATICAL ASPECTS OF ELECTROMAGNETIC THEORY III, by Bernard Friedman. Technical rept. no. 4 on Contract Nonr-222(60). Jan 60, 44p.
Order from LC mi$3.30, ph$7.80 PB 152 869

Contents:
Bessel functions
Field produced by a source in the presence of a conducting wedge

Danish National Committee of URSI.
OBSERVATIONS OF "WHISTLERS" AND VLF PHENOMENA AT GODHAVN, GREENLAND, by Eigil Ungstrup. Technical note no. 2 on Contract AF 61(514)1309. 1 July 59, 4p. 5 refs. AFCRC TN-59-469; AD-231 804.
Order from LC mi$1.80, ph$1.80 PB 153 279

Diamond Ordnance Fuze Labs., Washington, D. C.
THE MAGNETOSTATIC MODES OF A SMALL HOLLOW CYLINDER OF FERRITE, by Clyde Morrison. 15 Nov 60, 18p. 5 refs. TR-881.
Order from LC mi$2.40, ph$3.30 PB 152 923

Magnetostatic modes are shown to exist in hollow cylinders of ferrite. The field strength at which resonance for each mode occurs is given and expressions for power absorbed by the mode are derived. (Author)

Laboratoire de Ferromagnetisme, Institut de Physique, Strasbourg (France).
PREPARATION OF IRON PHOSPHIDES, IRON BORIDES, AND THE STUDY OF THEIR DIFFERENT MAGNETIC PROPERTIES, by M. R. Forrer. Final technical rept. no. 1, 1 Nov 58-1 Nov 59 on Contract DA 91-591-euc-977-01-1095-59. [1960] 30p.
AD-230 071.
Order from LC mi$2.70, ph$4.80 PB 153 277

Fe_3P, Fe_2P, and FeP were prepared. All of these compounds were ferromagnetic but only FeP demonstrated ferromagnetism beyond room temperature. Fe_2B and FeB were prepared by melting in a high frequency furnace. Fe_2B had a ferromagnetic Curie point at 740°C and a magnetic transition at 245°C. Experimentation on a single crystal of Fe_2B led to the conclusion that at 245°C the magnetocrystalline energy was zero. The saturation magnetization at room temperature measured for polycrystalline FeB was 1.02 Bohr magnetrons. The coercive force of FeB at room temperature was 92 oer. This coercive force decreased in a quadratic function of the temperature towards zero for the Curie point at 309°C. The Curie points of Co_3B and Co_2B were 485° and 155°C, respectively.

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
TEMPERATURE AND SPACE-CHARGE EFFECTS IN LIQUID HYDROCARBONS, by R. Coelho and M. Bono. Rept. on Contracts Nonr-1841(10) and AT(30-1)-1937. June 59, 14p. 8 refs. Technical rept. 137; AD-219 687.
Order from LC mi$2.40, ph$3.30 PB 149 725

Preliminary results on the residual d-c conduction and space-charge polarization in n-hexane and n-heptane under highly inhomogeneous field conditions (thin wire in coaxial cylinder) are presented. The gross features of the current-voltage characteristics can be explained by dissociation of polar impurities in the region of high field strength. The dependence on polarity can be explained by space-charge distortion of the field. For negative wire, field emission appears to occur from the wire, surrounding it with a current-limiting space charge.

Naval Ordnance Test Station, China Lake, Calif.
FURTHER STUDIES OF THE INFLUENCE OF LIGHT ON FERROMAGNETISM, by Julian L. Thompson. 26 Sep 58, 19p. 4 refs. NOTS 2113; NAVORD rept. 6415
AD-211 397.
Order from LC mi$2.40, ph$3.30 PB 149 654

The effect of light on ferromagnetism is largely due to the red and near-infrared portions of the spectrum. Thermal changes of permeability are shown to be applicable to the detection of steady illumination. Domain boundaries in thin ferromagnetic films are shown to move under the influence of mechanical vibration, and, light is believed to produce the same effect. (Author) (See also PB 148 370)

Electronics

Armour Research Foundation, Chicago, Ill.
SUPER POWER CATHODE STUDY, by Robert G. Pohl. Final rept. no. 2, phase no. 2, 5 July-20 Oct 60, on Contract AF 30(602)2043. 20 Oct 60, 25p. 3 refs.
ARF 1146-6.
Order from LC mi$2.70, ph$4.80 PB 152 962

X-ray and electron diffraction studies of "nickelate" cathodes show that cathodes that have been processed so as to obtain high sputter voltages and high thermionic emission do not contain the compound barium nickelate. Rather the finished cathode consists of a matrix cathode wherein barium oxide or other barium compounds are distributed within a nickel matrix. The "nickelate" phase of the processing serves as a solvent permitting solution of barium compounds into the nickel substrate. Subsequent processing decomposes barium nickelate out of existence. The finished cathode is a matrix cathode possessing a more homogeneous distribution of constituents than obtained in the customary sintered bariated-nickel matrix cathode. A study of the darkening due to ion bombardment of bariated nickel matrix cathodes employed in high power klystrons shows an excess of calcium in the darkened area, together with the formation of tungstates and zirconates, with a resulting loss of reducing agent, zirconium. The experimental procedures followed in constructing a test diode are given. (Author) (See also PB 149 761)

Carnegie Inst. of Tech., Pittsburgh, Pa.
VELOCITY DISTRIBUTIONS IN DIRECT AND REFLECTED ATOMIC BEAMS, by J. H. McFee (Doctoral thesis) and P. M. Marcus. Technical rept. no. 1 on Contract Nonr-760(11). 8 Jan 60, 169p. 63 refs.
AD-231 313.
Order from LC mi$7.80, ph$25.80 PB 152 882

Extensive and accurate measurements were made of the velocity distributions in potassium atomic beams emerging directly from an oven. At low source (oven) pressures, the distributions were found to be highly Maxwellian and were characterized by temperatures which corresponded closely to the measured source temperatures. At high source pressures (mean-free-path in source $\cong$ source slit width) the velocity distribution in the beam was found to be substantially deficient in low velocity atoms, as compared to the Maxwellian prediction. The atomic beam was scattered (reflected) from various solid surfaces and the velocity distribution of the scattered atoms was measured. The surfaces investigated included polycrystalline Cu, W, and Au, and cleavage planes of MgO and LiF single crystals. Surface temperatures ranged from 500°K to

2100°K. In the case of the Cu, W, Au, and MgO surfaces, the velocity distributions of the reflected beams were found to be highly Maxwellian. The temperatures of the reflected-beam distributions apparently corresponded closely to the surface temperatures, although only in the case of the Cu surface was an accurate and independent measurement of the surface temperature possible. The exchange of energy between the atomic beam and these surfaces was, essentially complete. The reflection of K atoms from the cleaved LiF surface was anomalous. The reflected-beam velocity distribution was definitely non-Maxwellian, and the energy exchange between the beam and the surface was found to be incomplete (approximately 70% of the maximum possible) for surface temperatures between 600°K and 900°K. (Author)

Electronics Research Lab., U. of California, Berkeley.
ELECTRON AND PLASMA BEAMS, by D. H. Sloan, Charles Susskind and others. Scientific rept. no. 8 (Interim annual rept. for 1959-1960) on Contract AF 19(604)2270. 15 June 60, 62p. 11 refs. IER series no. 60, issue no. 284; AFCRL TN-60-971.
Order from LC mi$3.90, ph$10.80 PB 152 960

Contents:
Electron optics
Cross-field gaseous tubes
Plasma investigations
Semiconductor properties of ionized gas
Interactions between electron beams and plasmas

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
MICROWAVE PROBING OF A MEDIUM DENSITY HYDROGEN PLASMA, by M. Ettenberg, M. Mentzoni and T. Tamir. Rept. on Contract AF 19(604)4143. 31 May 60, 43p. 9 refs. Research rept. PIBMRI-808-60; AFCRL-TN-60-988.
Order from LC mi$3.30, ph$7.80 PB 153 089

A cw microwave beam is propagated through a pulsed discharge in hydrogen of up to several hundred amperes peak current. The transmitted signal is the basis for measuring the attenuation coefficient and thereby the electron density as a function of time, assuming a collision frequency from the literature. Measurements have been made on the decay constants of the afterglow and it is possible to assign an attachment frequency of 6×10^4 p sec^{-1} to the major decay process in the presence interval 1-7 mm Hg. The oscilloscope trace of the transmitted signal sometimes displays irregularities in the form of peaks and overshoots which undergo displacements on the time scale and changes in width as the frequency or electron density changes. Some optical data have also been taken of the time dependence of the total luminosity of the discharge as well as of individual Balmer lines. Finally, a possible interference mechanism between a glass wave (surface wave) and a direct wave propagating diametrically through the cylinder is considered. (Author)

Polytechnic Inst. of Brooklyn, N. Y.
ELECTROMAGNETIC THEORY OF D. C. EFFECTS IN FERROMAGNETIC RESONANCE, by H. J. Juretschke. Technical rept. no. 7 on Contract Nonr-839(06). 1 Jan 60, 23p. 14 refs. AD-235 288.
Order from LC mi$2.70, ph$4.80 PB 152 868

Electrical conduction in a ferromagnetic metal generally depends on the direction of the magnetization $\underline{M}$. If the average direction of $\underline{M}$ is fixed by an applied static magnetic field, H_o, a superimposed electromagnetic field will produce two effects in the metal: (1) its magnetic field causes the magnetization to precess at the applied frequency about its average direction, and (2) its electric field excites oscillating conduction currents. (1) These effects are coupled and will produce, among other results, time-independent fields and currents. D. C. effects accompanying ferromagnetic resonance have been observed experimentally, and are in qualitative agreement with the interpretation The present report develops a more detailed theory of the effects to be expected on this basis.

Technical Research Group, Syosset, N. Y.
ON THE GREEN'S FUNCTION FOR A CIRCULAR CYLINDER, by Stephen Barone. Scientific rept. no. 2 on Contract AF 19(604)3476. 13 Jan 60, 85p. 10 refs. TRG-121-SR-2; AFCRC-TN-60-575.
Order from LC mi$4.80, ph$13.80 PB 152 777

It is shown in some detail how the Green's function for a cylinder passes into the Green's function for a plane as the radius of the cylinder becomes large. For the case of a cylinder which obeys an impedance boundary condition, the asymptotic evaluation of the Green's function is carried out in detail. A similar evaluation is carried out for the case of a plane which obeys an impedance boundary condition and a comparison between the two cases, plane and cylinder, is made.

Molecular Physics and Spectroscopy

Arnold Engineering Development Center [Tullahoma, Tenn.].
THE VISIBLE PLASMA FLAME SPECTRA OF ARGON AND HELIUM, by W. K. McGregor, J. J. Ehrlich, and J. D. Bratcher. Rept. on ARO, Inc., Contract AF 40(600)800. Dec 59, 16p. 5 refs. AEDC TN-59-134; AD-229 965.
Order from LC mi$2.40, ph$3.30 PB 152 664

The electromagnetic spectrum is being employed as a diagnostic tool in research on the kinetics of gases expanding through nozzles. The spectra of argon and helium plasma generated in an electric arc plasma generator are reported. Tables are given of emission lines detected in the range of 3000 to 7000 A using a grating spectrograph; quantum transition data from referenced sources are included for each emitted line. The spectra are notable for their apparent freedom from emissions caused by the gas stream contamination and for the distinct appearance of lines attributable to ions. The data obtained indicate the utility of the spectral data for gas stream diagnostics. (Author)

Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATION OF THE INFRARED ABSORPTION OF SELECTED AROMATIC COMPOUNDS IN THE REGION OF 2 TO 35 MICRONS, by R. J. Jakobsen. Rept. for 1 Feb 59-31 Jan 60 on Experimental Techniques for Materials Research, Contract AF 33(616)6140. Sep 60, 44p. 30 refs. WADD Technical rept. 60-204.
Order from OTS $1.25 PB 171 342

Complete vibrational assignments have been made for phenol, p-xylene, p-cresol, and hydroquinone. Infrared spectra of the selected para-substituted phenols have been recorded over the 2- to 35-micron range. With the aid of these infrared data and of Raman spectra, most of the low-frequency vibrations have been assigned. The reliability of the assignments and the significance of the assignments are discussed, as well as the determination of the modes of vibration. Correlation studies of frequency with physical properties have been made for the assigned frequencies that are sensitive to the nature of the substituent. (Author)

Massachusetts Inst. of Tech., Cambridge.
IRON SERIES HARTREE-FOCK CALCULATIONS, by Richard E. Watson. Technical rept. no. 12 on Contract Nonr-1841(34). 15 June 59, 264p. 26 refs. AD-219 981.
Order from LC mi$11.10, ph$41.10 PB 149 639

The results are presented of 76 analytic Hartree-Fock (H-F) calculations for iron series atoms and ions. Iron series elements refer to the first long period of the periodic table. The period is involved with the filling of the 3d shell, and starts with Sc (atomic no. 21) and ends with Ni (atomic no. 28). The elements which are included are Sc, Ti, V, Cr, Mn, Fe, Co, and Ni. Results are also reported for singly and more highly ionized Cu. These calculations extend the knowledge of how the atomic 3d wave functions vary with changes in atomic no. and state of ionization. The analysis is restricted to the H-F calculations for iron series atoms with non-closed shells. These cases have an array of single and multi-determinantal wave functions which are eigenfunctions of the whole atom quantum numbers. Necessary definitions are made and the H-F equations are discussed. Methods for solving the H-F equations are discussed with emphasis on the Roothaan procedure. Results show that there is good agreement between the analytic calculations and the existing numerical solutions, and poor agreement with the observed atomic multiplets and ionization energies.

Massachusetts Inst. of Tech., Cambridge.
SOLID-STATE AND MOLECULAR THEORY GROUP, by J. C. Slater. Quarterly progress rept. no. 33 on Contract Nonr-1841(34). 15 July 59, 58p. 9 refs. AD-220 853.
Order from LC mi$3.60, ph$9.30 PB 149 680

Contents:
Hartree-Fock Calculations for Mn^{++} in Cubic Fields
Energy Bands in Iron
Symmetrized Plane Waves and Projection Operators
Self-Consistent Hartree-Fock Energy Bands
The Linear Chain
Interaction of a Hole with Mobile Lattice Ions in KCl
A Fortran Encoded Syntactic Unit Locater
An Integrated Operating System for a High Speed Computer
Multi-Center Integral Programs for I.B.M. 704 Computer

Massachusetts Inst. of Tech., Cambridge.
SOLID-STATE AND MOLECULAR THEORY GROUP. Quarterly progress rept. no. 35 on Contract Nonr-1841(34). 15 Jan 60, 73p. 67 refs. AD-232 049.
Order from LC mi$4.50, ph$12.30 PB 152 863

Contents:
Multiplet structure in crystalline fields
The effect of crystalline fields on magnetic form factors
The Mn^{++} ion in crystalline fields
Approximate wave functions for atomic Be
Molecular calculations
Automatic coding, symbol manipulation and related topics
Programs for evaluation of molecular integrals; four centered integrals
Condon-Shortley coefficients
Energy bands in iron
Band structure calculation
Energy band calculation
The linear chain
Interactions of a hole with mobile lattice ions in KCl
(See also PB 149 517)

Spectroscopy Lab., Pennsylvania State U., University Park.
TECHNICAL REPORT, JULY 1, 1958-JANUARY 1, 1960. Rept. on Contract Nonr-656(12). [1960] 115p. 57 refs. AD-231 151.
Order from LC mi$6.00, ph$18.30 PB 152 864

Contents:
Molecular constants of carbonyl sulfide and a coriolis perturbation, by G. D. Saksena, T. A. Wiggins, and D. H. Rank
A 5-meter vacuum spectrometer for the near infrared, by D. H. Rank, G. D. Saksena and others
Highly precise wavelengths in the infrared, by D. H. Rank, G. Skorinko and others
Vibration-rotation spectra of HCN, by D. H. Rank, G. Skorinko and others
Precision measurements of the wavelengths of infrared absorption lines with diffraction gratings, by D. H. Rank
Pressure-induced shifts of HCl lines due to foreign gases, by D. H. Rank, W. B. Birtley and others
Pressure shifting of spectrum lines, some empirical generalizations, by D. H. Rank, W. B. Birtley and others
(See also PB 143 097)

Optics

Army Chemical [Research and Development] Labs., Army Chemical Center, Md.
THE FABRICATION OF PLASTIC INFRARED FILTER WHEELS, by Hugh R. Carlon. [1 Apr 59] 10p. 2 refs. CWL Technical memo no. 32-41; AD-213 702.
Order from LC mi$1.80, ph$1.80 PB 149 641

The second of three technical memoranda dealing with various optical materials used in the filter wheel modification of the LOPAIR (Long-Path Infrared) toxic agent alarm device. Since the modified LOPAIR instrument utilizes a rotating filter wheel for wavelength selection, various filter wheel construction techniques were investigated in an attempt to construct a durable, inexpensive non-hygroscopic, easily duplicated wheel. The plastic (polyethylene substrate) filter wheel evolved during these investigations is discussed in this report. Fluorothene (poly-trifluoro-monochloroethylene) and talc (Magnesium Silicate) are used as the basic filter materials. Subsequent testing has shown the plastic filter wheel to be completely reliable. (Author)

Battelle-Institut E. V., Frankfurt-am-Main (West Germany).
PERFORMANCE OF WORK TO DEVELOP METHODS FOR PRODUCTION OF INFRARED INTERFERENCE FILTERS IN THE RANGE OF 4.5 TO 15 MICRONS USING SEMICONDUCTOR MATERIAL AS INTERFERING LAYERS, AND DIFFERENT CARRIER PLATES, SUCH AS SAPPHIRE, MICA ARSENIC TRISULFIDE, OR SILVER CHLORIDE. Final rept. for 1 Dec 58-29 Feb 60 on Contract DA 91-591-EUC-1014. [1960] 43p. 24 refs.
Order from LC mi$3.30, ph$7.80 PB 149 657

Attempts were made to prepare these filters by evaporating the interference layer onto the carrier plates under vacuum. Different combinations of filter materials were employed in the examinations and the following parameters were varied: material of the carrier plate, material of the interference layers, number of the interference layers, thickness of the interference layers.

Block Associates, Inc., Cambridge, Mass.
RESEARCH AND DEVELOPMENT TO PRODUCE AN INFRARED SOURCE, by Merle J. Persky. Final rept. no. 1, Part 1 on Contract AF 19(604)2420. 31 July 60, 32p. 5 refs. GRD-TR-60-294-1; AD-244 901.
Order from LC mi$3.00, ph$6.30 PB 152 714-1

A study of the feasibility of enveloping a flare with an infrared filter for use as an infrared signal augmenter was performed. It is shown that an intervening coaxial air stream can be used to protect an enveloping filter from the flame of a magnesium flare. A number of successful feasibility demonstrations were made with flare "RITA" supplied by Picatinny Arsenal. The flare was enveloped by a "pyrex" glass tube. One such demonstration used a coaxial protective air velocity of 150 m.p.h. The inside diameter of the tube was 3 inches. The assembly was 43 inches long. Also, it was demonstrated that such a system has a very low ratio of visible to infrared emission. The maximum ratio of visible to infrared energy over 99% of the spherical field of emission (excluding the exit) is approximately 1/10%. The ratio is greater than 1% only over 7 x 10^{-5}% of the spherical field of emission. The successful filter was a grade of commercial architectural black plate glass known as Pittsburgh Plate Black Carrara whose spectral transmission is similar to Corning 7-56. (Author) (See also PB 152 713)

Block Associates, Inc., Cambridge, Mass.
RESEARCH, DEVELOPMENT, AND CONSTRUCTION OF ROCKET-BORNE RADIOMETERS, by Frits Zernike, Jr. Final rept. no. 1, Part 2 on Contract AF 19(604)2420. 31 July 60, 12p. GRD-TR-60-294-2; AD-244 902.
Order from LC mi$2.40, ph$3.30 PB 152 714-2

This report describes two rocketborne infrared radiometers for use in observing the tail plume radiation of an Aerobee Hi research rocket. The instruments, mounted in two of the rocket's fins, were launched in an Aerobee Hi at Holloman AFB, Alamogordo, New Mexico, in June, 1959. The instruments were filter radiometers, one using a lead sulfide detector to examine sections of the spectrum from 0.5 μ to 3 μ, the other using a Barnes thermistor bolometer to examine sections from 3 μ to 30 μ. The operation of the instruments is described and some of the design considerations are noted. (Author) (See also PB 152 714-1)

Block Associates, Inc., Cambridge, Mass.
THE DESIGN, CONSTRUCTION AND USE OF A GROUND BASED INFRARED RADIOMETER FOR OBSERVATION OF SATELLITES, by R. Gelinas. Final rept. no. 1, Part 3 on Contract AF 19(604)2420. 31 July 60, 41p. 8 refs. GRD-TR-294-3; AD-244 903.
Order from LC mi$3.30, ph$7.80 PB 152 714-3

This report investigates the problem of the optimization of signal to noise by means of optical parameters, detector configuration, and signal chopping for cases of current noise, photon noise, and lattice noise limited photoconductors. In addition the problem of detector choice for expected signal wavelength is explored. A feasibility system is described having a 60" diameter parabolic reflector with an InSb detector, 18 mm. square, cooled to -196°C and slaved to Millstone. The final system is expected to consist of a 60" diameter Schmidt corrected spherical reflector with an InSb strip detector, scanned by a continuously moving belt along the strip and cooled to -196°C. (Author) (See also PB 152 714-2)

Block Associates, Inc., Cambridge, Mass.
THE DESIGN AND CONSTRUCTION OF AN INFRARED SPECTRO-RADIOMETER FOR OBSERVATION OF THE EARTH FROM A HIGH ALTITUDE VEHICLE, by Ronald R. Willey, Jr. Final rept. no. 1, Part 4 on Contract AF 19(604)2420. 31 July 60, 16p. GRD-TR-60-294-4; AD-244 904.
Order from LC mi$2.40, ph$3.30 PB 152 714-4

A prototype satellite interferometer spectro-radiometer has been built in order to study the infrared energy from the earth. The theory of the device, a rapid scanning interference spectrometer, and the construction of a suitable cam-driven scanning mechanism is discussed. More work is required to produce a scanning drive which will withstand the environmental conditions involved in satellite applications. (Author)
Included in the report is:
Rapid scanning interference spectrometry, pub. in Jnl. of Optical Society of America, v. 50, no. 3, Mar 60. (See also PB 152 714-3)

Block Associates, Inc., Cambridge, Mass.
RESEARCH, DEVELOPMENT, AND CONSTRUCTION OF A ROCKET-BORNE SPECTROMETER, by Philip N. Gallagher, Jr. and Frits Zernike, Jr. Scientific rept. no. 1 on Contract AF 19(604)5738. 1 Aug 60, 17p. 1 ref. GRD-TN-60-610; AD-244 900.
Order from LC mi$2.40, ph$3.30 PB 152 713

This report describes two rocketborne prism spectrometers, the second instrument being a modified version of the first. The instruments utilized a lithium fluoride prism, a scanning slit, and a lead selenide detector to examine the spectrum from 0.6 μ to 4 μ. Synchronous rectification was employed to improve the signal-to-noise ratio. Desirable design improvements suggested by the results of each instrument's operation are discussed. (Author)

Institute of Optics, U. of Rochester, N. Y.
A REFLECTOMETER FOR THE VACUUM ULTRAVIOLET, by Abbott Smith. Technical note b 4 on Contract AF 49(638)433. 2 Feb 60, 13p. 3 refs. AFOSR-TN-60-284; AD-234 920.
Order from LC mi$2.40, ph$3.30 PB 149 651

A newly designed device for the measurement of absolute reflectance in the vacuum ultraviolet region is discussed. Notable features of this reflectometer are compactness and simplicity. The source and monochromator with which the reflectometer is used are also discussed. The system produces data in the wavelength range 800 A. to 2500 A. at any angle of incidence between 15° and 80°. A sample reflectance curve for a crystal of KCl is shown. (Author)

Naval Ordnance Test Station, China Lake, Calif.
BIBLIOGRAPHY OF ELECTRO-OPTICAL AND MAGNETO-OPTICAL PHENOMENA AND THEIR APPLICATIONS, by J. M. Ruhge and D. Green. Dec 59, 49p. 516 refs. NOTS TP 2377; AD-235 612.
Order from LC mi$3.30, ph$7.80 PB 149 643

The bibliography contains entries taken from the Industrial Arts Index and from the book and technical report files of the NOTS Technical Library, covering the following topics: the Kerr electro-optical effects; magneto-optical effects; applications of piezoelectric crystals, iconoscopes, orthicons, and vidicons; image converter tubes; high-speed shutters; and the electroluminescent effect and its applications. The bibliography is current as of February 1959. (Author)

New York U., N. Y.
A STUDY OF THE FAR INFRARED PROPERTIES OF CRYSTALS, by J. H. Rohrbaugh. Scientific rept. #11, 1 Mar-31 May 60, on Millimeter Wave Project, Contract AF 19(604)2673; successor to Contracts W28-099-ac-171, AF 19(122)4 and AF 19(604)1115. [1960] 14p. 1 ref. AFCRC-TN-60-959; AD-244 601.
Order from LC mi$2.40, ph$3.30 PB 152 624

Contents:
The optical constants of NaCl – a comparison between theory and experiment
The spectrometer
(See also PB 149 172)

Physics Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
STEEL MIRRORS FOR A STREAK CAMERA, by O. Van P. Sessoms. Rept. for Feb 59-Mar 60 on Nuclear Effects on Space and Re-entry Vehicles. Aug 60, 13p. 4 refs. WADD Technical note 60-155.
Order from OTS $0.50 PB 171 191

In the development of an ultra-high speed streak camera it became necessary to produce small ferromagnetic prisms, whose faces were optically flat mirrors. This report describes the grinding and polishing techniques used to prepare optically flat surfaces on steel prisms and the problems encountered in this work. Standard optical shop equipment was used; the techniques employed were similar to those used in prepared glass mirrors. (Author)

Solid State Physics

Armour Research Foundation, Chicago, Ill.
PRESSURE EFFECTS IN LUMINESCENCE, by L. Reiffel. Final rept. (including Technical note no. 4) on Contract AF 49(638)113. 16 Sep 60, 31p. 29 refs. ARF 1099-15; TR 60-128; AFOSR-TN-60-1119; AD-245 196.
Order from LC mi$3.00, ph$6.30 PB 152 731

Abstracts of previous work under AFOSR sponsorship are given. Equations required for estimates on the magnitude of various pressure-induced effects are included. The effects treated include: quantum efficiency for a metastable state; mean life of a metastable state; lifetime of a thermally quenched emitting state; quantum efficiency of a thermally quenched emitting state; emission band position; emission band width; emission from communicating levels; cross-over probability. (Author) (See also PB 139 215).

Bell Telephone Labs., Inc., Whippany, N. J.
FUNDAMENTAL STUDIES OF THE PROPERTIES OF NATURAL AND SYNTHETIC QUARTZ CRYSTALS, by J. C. King. Interim rept. no. 12, 1 June-31 Aug 58 on Contract DA 36-039-sc-64586. 2 June 59, 28p. 14 refs. Rept. no. 27424-K; AD-227 100.
Order from LC mi$2.70, ph$4.80 PB 149 721

Further evidence of the segregation of imperfection in synthetic quartz, according to growth directions, was found. The defect induced absorption at 50°K, for a frequency of 5 mc, is nearly 2 decades higher in growth along the +X-axis relative to the absorption in growth along the Z-axis within the same crystal. Changes in the behavior of the 20°K acoustic absorption as a function of strain amplitude were studied in a sample of synthetic quartz. (See also PB 139 743)

Bell Telephone Labs., Whippany, N. J.
FUNDAMENTAL STUDIES OF THE PROPERTIES OF NATURAL AND SYNTHETIC QUARTZ CRYSTALS, by J. C. King. Interim rept. no. 14, 1 Apr-30 June 59, on Contract DA 36-039-sc-64586. 1 Dec 59, 27p. 4 refs. Rept. no. 27424-M; AD-231 409.
Order from LC mi$2.70, ph$4.80 PB 149 723

The acoustic absorption in synthetic quartz specimens was measured and analyzed. A specimen designated BTL Run 691 was grown hydrothermally on a Z-face seed crystal in a D_2O solution. No significant changes were noted in the 50°K relaxation absorption in resonators made of this material as compared with similar synthetic quartz grown in an H_2O solution. A Z-growth synthetic resonator specimen was subjected to several annealing operations. First the specimen was annealed in air at 500°C and then twice vacuum annealed at the same temperature. After each of these operations the low-temperature acoustic absorption of the Z-growth material was remeasured, and in every case the magnitude of the 50°K absorption was diminished. Two AT-cut synthetic quartz crystal resonators, one from growth on a Z-minor rhombohedral seed surface and the other from a Z-cut seed, where subjected to static electric fields, perpendicular to their major surfaces, while at an elevated temperature. The conclusion was reached that field sweeping AT-cut blanks at 0.45 kv/cm and 500°C does not effect the elimination of loss-inducing crystal defects. The acoustic improvements in both Z-face and Z-growth AT-cut crystals after applying a field of 2.7 kv/cm suggested that for higher fields the impurities are removed from the body of the crystal. (See also PB 149 721)

Bell Telephone Labs., Inc., Whippany, N. J.
FUNDAMENTAL STUDIES OF THE PROPERTIES OF NATURAL AND SYNTHETIC QUARTZ CRYSTALS, by J. C. King. Interim rept. no. 15, 1 July-30 Sep 59, on Contract DA 36-039-sc-64586. 15 Jan 60, 29p. 11 refs. Rept. no. 27424-N; AD-233 826.
Order from LC mi$2.70, ph$4.80 PB 149 724

The acoustic behavior of an Al-doped quartz specimen grown on a z-minor rhombohedral seed crystal was examined. Crystal unit X-200 was subjected to a total exposure of about 10^7r. Three modifications were noted which were due to the irradiation: (1) in association with a high density of color centers, relaxation absorption appeared at 100°K; (2) the 50°K defect concentration was reduced by a factor of 6:1; and (3) a growth occurred in the absorption below 30°K, emerging as a loss peak near 12°K for all measured frequencies of vibration. The acoustic loss in crystal I-14 between 4.2° and 80°K after irradiation was determined. Down to about 15°K, little difference was noted in the absorption in the frequency range which extended from 3 to 17 mc. A special crystal holder was constructed which allowed a quartz specimen to be x-irradiated at 77°K and allowed the measurement of its resonator characteristics while warming to room temperature. (See also PB 149 723)

Clevite Research Center, Cleveland, Ohio.
STUDY OF METHODS FOR IMPROVING THE QUALITY OF SYNTHETIC QUARTZ, by Danforth R. Hale. Quarterly rept. no. 1, 1 Dec 58-28 Feb 59, on Contract DA 36-039-sc-78247. 26 Mar 59, 15p. 3 refs.
Order from LC mi$2.40, ph$3.30 PB 149 692

Five synthetic quartz crystals have been processed into resonators for making electrical measurements on them. Experimental synthetic growth has emphasized high purity and Z-cut seeds. Special feed sources under investigation comprise: quartz recrystallized on the Z-surface, superpure silicon metal, and silica gel. (Author)

Electro-Optical Systems, Inc., Pasadena, Calif.
INVESTIGATION OF COMPOSITE OR STACKED VARIABLE ENERGY GAP PHOTOVOLTAIC SOLAR ENERGY CONVERTER, by J. W. Burns, W. Evans, and H. Armstrong. Semiannual progress rept. no. 1, 1 Sep 59-1 Jan 60 on Contract DA 36-039-sc-85244. 8 Jan 60, 48p. EOS rept. no. 400-2Q-1, ARPA Order no. 80-59; AD-232 922.
Order from LC mi$3.30, ph$7.80 PB 149 706

Progress is reported on the attainment of improved photovoltaic solar cell conversion efficiencies by means of the stacked or composite energy gap solar cell structure. A theoretical analysis is given of the performance of a composite photovoltaic solar energy converter consisting of 2 separate cells of differing energy gaps. A description is given of the experimental determination of the optical transmission of CdS and of the transmission-reflection characteristics of a spectrally reflective mirror. An experimental program is being conducted on the composite energy gap solar cell employing a silicon solar cell, a spectrally reflective mirror, and a high energy gap solar cell. (Author)

General Electric Co., Schenectady, N. Y.
INVESTIGATION OF ORGANIC SEMICONDUCTORS, by G. P. Brown and S. Afterbut. Rept. for 1 July 58-31 Oct 59 on Electrical and Electronic Materials, Contract AF 33(616)5949. Sep 60, 83p. 78 refs. WADD Technical rept. 59-469.
Order from OTS $2.25 PB 171 340

The specific resistivity as a function of temperature has been determined for a variety of organic compounds including polyacrylonitrile, polyacrylonitrile containing additives, 1, 1-diphenyl-2-picrylhydrazyl, naphthalene and its 1-amino-, 1-nitro-, 2-methoxy-, and 2-phenyl derivatives, 1, 4-diphenyl-1, 3-butadiene, 1, 8-diphenyl-1, 3, 5, 7-octatetraene, and several picrates. The resistivities were obtained on materials in various stages of purification, over a wide range of applied voltages, in nitrogen and in air, and in the solid and (wherever feasible) in the liquid state. A zone refiner was designed and used in the purification of several materials. A model for conductivity in organic compounds has been advanced. (Author)

General Electric Research Lab., Schenectady, N. Y.
APPLICATIONS OF TUNNELING TO ACTIVE DIODES, by R. N. Hall. Scientific rept. no. 1 on Contract AF 19(604)6623. 22 June 60, 5p. ERD-TN-60-780.
Order from LC mi$1.80, ph$1.80 PB 152 473

The variation of potential with distance in degenerately doped p-n junctions at absolute zero has been calculated exactly, and a simple but reasonably accurate approximation formula has been found. Preliminary resistivity and Hall mobility data in GaP are reported. (Author)

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
QUARTZ CRYSTAL STUDIES AND MEASUREMENTS. PHASE I. MOTIONAL PARAMETERS. PHASE II. EQUIVALENT ELECTRICAL PARAMETERS. PHASE III. AGING OF QUARTZ RESONATORS, by Issac Koga.

J. E. Rhodes and others. Quarterly rept. no. 1, 1 Aug-1 Nov 58, on Contract DA 36-039-sc-78910. [1958] 87p. 3 refs. AD-219 334.
Order from LC mi$4.80, ph$13.80 PB 149 695

Research was started to increase understanding of the behavior of quartz crystals as frequency control and filter devices. The motional parameters of thickness shear modes of AT- and BT-cut quartz crystals are studied to: (1) measure as a function of the plate and electrode size the motional capacitance and shunt capacitance on quartz crystal disks of the AT- and BT-types in the range 1 to 10 mc; (2) measure the motional capacitance of the inharmonic overtones as a function of the plate and electrode size, and to compare the functional dependence of the motional capacitance on the electrode size with the solution following from the strain distribution of the mode; and (3) measure the capacitance ratio and the shunt capacitance in its variation with the variation of the inharmonic overtones. The behavior of commercially produced crystals in the conventional HC 6/U mounts was measured and compared with previous and continuing measurements on laboratory units. One hundred quartz crystal resonators of type CR-19/U were obtained and one-third of each group received was placed in a constant temperature oven at 85°C for periodic frequency measurements. Forty-five aluminum plated resonators were fabricated in glass containers.

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
QUARTZ CRYSTAL STUDIES AND MEASUREMENTS. PHASE I. MOTIONAL PARAMETERS. PHASE II. EQUIVALENT ELECTRICAL PARAMETERS. PHASE III. AGING OF QUARTZ RESONATORS, by Issac Koga, J. E. Rhodes and others. Final rept. for 1 Aug 58-28 Feb 59 on Contract DA 36-039-sc-78910. [1959] 113p. 1 ref. AD-220 647.
Order from LC mi$6.00, ph$18.30 PB 149 696

Approximately 150 resonators fabricated here and mounted in glass containers have been stored at 85°C and periodically measured for frequency. Over one hundred of these were base-plated with aluminum and not overcoated to frequency. The crystal blanks of two groups were heated to 450°C in vacuo, cooled to 250°C, and coated with evaporated aluminum. Subsequently the units were baked out at 180°C for three hours at a pressure of 5×10^{-6} mm Hg and sealed off. These units showed drifts of less than 0.5 ppm in test periods of 60 to 160 days. Aluminum plated units similarly fabricated and overcoated to frequency with evaporated aluminum exhibited drifts only slightly larger. Resonators plated with bimetal films of gold or silver then with electroplated nickel exhibited positive drift vectors whereas those coated with aluminum plus gold exhibited negative ones. (Author) (See also PB 149 695)

Gordon McKay Lab. of Applied Science, Harvard U., Cambridge, Mass.
DIELECTRIC CONSTANT OF GERMANIUM AND SILICON AS A FUNCTION OF VOLUME, by Manuel Cardona. Technical rept. HP-5 on Contract Nonr-1866(10). 1 July 59, 140p. 111 refs. AD-226 982.
Order from LC mi$6.90, ph$21.30 PB 149 628

An attempt is made to enlarge the knowledge of the pressure and temperature dependence of the physical properties of Ge and Si. The pressure and temperature dependence of the RF dielectric constant of very high resistivity Ge and Si is reported. These results are compared with the known pressure and temperature effects on the band structure. A description is given of the pressure and temperature dependence of the IR refractive index of high purity Ge and Si. The pressure dependence of the vertical energy gap at the center of the Brillouin zone for Ge is reported. An increase of this gap with pressure at the rate $\frac{dE}{dp} = (1.3 \pm 0.1 \times 10^{-5}$ ev x cm^2/kg is found. Measurements are described of the electric susceptibility of the free carriers in heavily doped n and p-type Ge and Si, as a function of temperature and carrier concentration. (Author)

Honeywell Research Center, Hopkins, Minn.
THE DUCTILE-BRITTLE TRANSITION IN IONIC SOLIDS, by T. L. Johnston, R. J. Stokes, and C. H. Li. Technical rept. no. 5 on Contract Nonr-2456(00). July 59, 20p. 9 refs. HR-59-474; AD-220 587.
Order from LC mi$2.40, ph$3.30 PB 149 684

Polished monocrystals of silver chloride, sodium chloride, lithium fluoride and magnesium oxide have been shown to exhibit ductility transitions when loaded by impact bending. The behavior of silver chloride stood apart from that of the other solids in that the temperature below which it cleaved without macroscopic deformation was less than 0.1 T_m (where T_m is the melting point in degrees Kelvin). It is emphasized that the ductility of ionic solids is extremely sensitive to strain rate of the presence of a notch. (Author)

Honeywell Research Center, Hopkins, Minn.
EFFECT OF GRAIN SIZE ON THE DEFORMATION OF POLYCRYSTALLINE SILVER CHLORIDE AT VARIOUS TEMPERATURES, by R. D. Carnahan, T. L. Johnston and others. Technical rept. no. 7 on Contract Nonr-2456(00). Jan 60, 22p. 5 refs. HR-60-412; AD-234 124.
Order from LC mi$2.70, ph$4.80 PB 152 891

The effect of grain size on the stress-strain curve of polycrystalline silver chloride has been determined at liquid nitrogen temperature, -72°C and 26°C. It has been shown that when pencil glide is the operative slip mode (at -72°C and 26°C), a change in grain size has only a minor effect; indeed, the proportional limit is independent of grain size at these temperatures. At liquid nitrogen temperature, fewer slip systems are operative and slip bands are quite straight. At this temperature, the stress-strain curve is sensitive to a change in grain size, the proportional limit and rate of work hardening increase with a decrease in grain size. In addition, it has been found that when slip is confined to flat crystallographic surfaces as at liquid nitrogen temperature, the ductility of polycrystals is limited by cleavage which is nucleated by an intergranular crack. In the upper temperature range, however, polycrystals are ductile and finally neck down to a knife edge. (Author)

Illinois U. [Urbana].
RESEARCH ON DIFFUSION AND IMPERFECTIONS IN METALS, by R. W. Balluffi. Final rept. on Contract AF 18(603)106. 30 Aug 60, 13p. 6 refs. AFOSR TR-60-130; AD-245 088.
Order from LC mi$2.40, ph$3.30 PB 152 683

Specific investigations include: (1) structural changes in the diffusion zone during chemical diffusion; (2) the effect of non-equilibrium vacancies on the kinetics of Kirkendall diffusion; (3) the Kirkendall effect in the hexagonal close-packed phase of cadmium and mercury; (4) the effect of simultaneous plastic deformation on self-diffusion in silver; (5) the effect of a steady rate of plastic deformation on chemical diffusion in copper-zinc alloys; (6) relative polygonization rates in a number of close-packed metals and alloys; (7) the determination of diffusion coefficients in chemical diffusion.

Institute of Mathematical Sciences, New York U., N. Y.
THE SOLUTION OF THE FUNCTIONAL DIFFERENTIAL EQUATION FOR THE STATISTICAL EQUILIBRIUM OF A CRYSTAL, by Robert M. Lewis and Joseph B. Keller. Rept. on Contract AF 49(638)341. Aug 60, 46p. 11 refs. Research rept. no. HT-6; AFOSR-TN-60-965; AD-245 399.
Order from LC mi$3.30, ph$7.80 PB 152 725

The equilibrium equation is solved in terms of a power series in the temperature and from it the results are obtained. The form of the solution was suggested by a consideration of the asymptotic evaluation, for low temperature, of the integral defining the generating functional. Although this is not a practical method of obtaining the series expansions, it has been carried out for the first term of the partition function. This consideration suggests that the expansions are asymptotic rather than convergent.

Leicester U. (Gt. Brit.).
INVESTIGATION OF THE CONDUCTION MECHANISM IN INSULATING SOLIDS, by Walter Eric Spear. Final technical rept. no. 1, 1 Oct 59-30 Oct 60 on Contract DA 91-591-EUC-1269. Oct 60, 38p. 34 refs.
Order from LC mi$3.00, ph$6.30 PB 152 925

A pulse method has been developed for the study of carrier mobility and trapping effects in insulating solids. A study of the effective hole mobility μ in vitreous Se is described. The dependence of the pulse amplitude on applied field, specimen thickness d and incident electron energy V_i is discussed. The application of the experimental method to single crystals of monoclinic Se, MgO and CdS is described.

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ANTIFERROMAGNETIC MATERIALS FOR MILLIMETER AND SUB-MILLIMETER DEVICES, by G. S. Heller, J. J. Stickler, and J. B. Thaxter. Rept. on Contract AF 19(604)7400. 8 Nov 60, 26p. 24 refs. 82G-0023; AD-245 992.
Order from LC mi$2.70, ph$4.80 PB 152 932

Because of their high internal fields, antiferromagnetic materials have natural resonant frequencies in the millimeter and submillimeter wavelength region of the electromagnetic spectrum. Since these normal modes are circularly polarized and can be tuned by an applied magnetic field, devices similar to the usual ferrite devices are possible at these high frequencies with the application of relatively low fields. The dynamics of a simple antiferromagnetic system are briefly reviewed and the important quantities which characterize antiferromagnetic devices are discussed. The figures of merit for antiferromagnetic resonance isolators and phase shift devices are derived. Experimental data on resonant frequency and line width, as well as a typical non-reciprocal resonance absorption trace showing a reverse to forward loss of 10 to 1 in chromic oxide at 140 kMcps and at 77°K is presented. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PHOTO AND THERMAL EFFECTS IN COMPENSATED ZINC DOPED GERMANIUM, by Robert J. Keyes. Rept. on Contract AF 19(604)7400. 21 Oct 60, 15p. 2 refs. 85G-0008; AD-245 671.
Order from LC mi$2.40, ph$3.30 PB 152 973

At low temperatures zinc doped germanium exhibits effects when the lowest zinc levels have been filled by electrons from compensating antimony impurities, including negative photo-conduction, a discontinuity in the temperature dependence of the sample resistivity, and storage of free electrons produced by radiation of greater energy than the semiconductor gap. A qualitative theory explains all the observations.

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOLID STATE RESEARCH. Quarterly progress rept. for 15 July 60 on Contract AF 19(604)5200. 16 Sep 60, 108p. 88 refs. AFCCDD-TN-60-1014; AD-243 927.
Order from LC mi$5.70, ph$16.80 PB 152 462

Contents:
Semiconductor device design
Chemistry
Materials research
Band structure of solids
Microwave and magnetic properties of solids
Magnetic materials
Magnetic films
Semiconductor components
Display techniques
(See also PB 153 251)

Materials Research Lab., Watertown Arsenal, Mass.
ON THE CONTRIBUTION OF THE FERMI CONTACT TERM TO THE MAGNETIC FIELD AT THE NUCLEUS, by R. E. Watson and A. J. Freeman. Nov 60, 7p. 9 refs. MRL rept. no. 89.
Order from LC mi$1.80, ph$1.80 PB 152 854

The dominant source of the effective magnetic field at the nuclei in ferromagnets was investigated for transition element atoms and ions by means of a series of spin (or exchange) polarized Hartree-Fock calculations. Calculations were done for both free atom and crude crystalline environments. The effective field is not however large enough to overcome the positive contributions of the outer electrons. (Author)

Metals Research Lab., Brown U., Providence, R. I.
ULTRASONIC ATTENUATION AND VELOCITY MEASUREMENTS IN SOLIDS, by Rohn Truell. Final rept. on Contract DA 19-020-505-ORD-3882. 1 Mar 59, 24p. 15 refs. WAL 143/14-50; AD-217 993.
Order from LC mi$2.70, ph$3.80 PB 149 690

Megacycle ultrasonic methods constitute a tool for the study of the physical properties of solid materials in the same way as do x-ray, electron, optical, and neutron diffraction methods, thermal and electrical conductivity methods, optical and microwave absorption measurements. The material presented is primarily the story of what physical properties can be studied by megacycle ultrasonic methods together with a discussion of the details of the methods that have been used.

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
TRANSMISSION LINE FORMULATION FOR SEMICONDUCTORS, by Herbert Kurss. Quarterly rept. no. 13, 1 July-30 Sep 59, on Contract DA 36-039-sc-73052. 30 Dec 59, 19p. Rept. R-523.38-59; PIB-453.38.
Order from LC mi$2.40, ph$3.30 PB 149 679

For plane wave scattering from a crystal plane, the geometry of the scattered rays, the losslessness, reciprocity, and symmetry constraints on the fields far from the crystal plane are derived. The energy band structure of a Kronig-Penny crystal is analyzed when (a) the crystal is semi-infinite (b) the crystal contains a symmetric impurity.

Naval Ordnance Lab., White Oak, Md.
TEMPERATURE DEPENDENCE OF THE GYROMAGNETIC EFFECT IN LITHIUM CHROMATE FERRITE, by R. S. Hebbert. 2 Jan 59, 14p. 6 refs. NAVORD rept. 5765; AD-213 537.
Order from LC mi$2.40, ph$3.30 PB 149 738

Measurements were taken of the gyromagnetism and magnetization of lithium chromate ferrite ($Li_{0.5}Fe_{1.25}Cr_{1.25}O_4$) through a temperature region including compensation points of both magnetization and spin. Certain qualitative predictions by Wangsness have already been verified; in the range 57°C to 68°C the direction of the Faraday rotation is reversed.

New York State Coll. of Ceramics, Alfred U.
DIELECTRIC LOSSES DUE TO DISLOCATIONS IN SAPPHIRE, by D. P. Detwiler and N. M. Tallan. Rept. on Contract AF 49(638)87. 29 June 60, 177p. 69 refs. AFOSR-TN-60-884.
Order from LC mi$8.10, ph$27.30 PB 152 544

When the dielectric loss of Linde flame-fusion grown, single crystal, clear sapphire was studied at frequencies between 10^2 and 10^4 cps and temperatures between -160 and 400°C, dielectric loss maxima were observed. The loss process was more pronounced with the optic axis in the direction of the applied field than with the optic axis perpendicular to the field. With careful balancing of the bridge-guard circuit system used, no significant conduction loss was observed in the temperature range studied. It is therefore suggested that the conduction loss commonly observed in the upper portion of this range for unguarded sapphire samples is on the surface rather than in the bulk of the crystal.

New York U., N. Y.
STOICHIOMETRY AND ELECTRONIC PROPERTIES OF PbTe, by Edward Miller, Kurt K. Komarek, and Irving B. Cadoff. Rept. for 1 Dec 56-30 Sep 59 on Solid State Research and Properties of Matter, Contract AF 33(616)3883. July 60, 61p. 35 refs. WADC Technical rept. 59-570, supersedes WADC-TR-59-570, Dec 59; AD-246 593.
Order from OTS $1.75 PB 171 356

Off-stoichiometric single crystals of PbTe were grown by the Bridgman technique at a solidification rate of 0.35 cm/hr. At this low solidification rate the crystals were longitudinally segregated, the composition at any point corresponding to that dictated by the solidus curve of the phase diagram. The phase diagram shows that PbTe has an off-stoichiometric melting point; the difference in concentration between the maximum melting point and the stoichiometric point being 0.002 atomic percent, with the congruent melting point on the tellurium rich side of the stoichiometric point. Stoichiometric PbTe is in equilibrium with liquid 0.41 weight percent rich in lead, the equilibrium temperature being 923.2°C. The solubility of both lead and tellurium in PbTe is restricted, the maximum lead and tellurium excess being 5×10^{19} atoms/cm^3. Resistivity, Hall coefficient, and thermoelectric power measurements were made as a function of temperature on three slices corresponding to stoichiometric, excess lead, and excess tellurium. The results obtained were analyzed for the basic electronic parameters of the material. The energy gap at absolute zero was calculated to be 0.24 eV, and has a temperature variation of $+2.5 \times 10^{-4}$ eV/°K. The mobility ratio is 2.2 ± 0.15 and the electron and hole room temperature mobilities are 1170 and 500 cm^2/volt-sec respectively. The electronic effective mass was found to be 0.22 m and the hole effective mass 0.29 m. (Author)

Northwestern U., Evanston, Ill.
RESEARCH ON THE PYROELECTRIC PROPERTIES OF SINGLE CRYSTALS OF CADMIUM SULFIDE AND ZINC SULFIDE, by R. Frerichs and W. Minkus. Rept. on Contract AF 33(616)5625. Aug 60, 151p. 38 refs. ARL Technical rept. 60-301.
Order from OTS $2.75 PB 171 338

This report describes the pyroelectric effect of a cadmium sulfide crystal and determines the values of its pyroelectric constant in the temperature range -195°C and 72°C. This is the first time that the temperature dependence of a pyroelectric constant has been determined for a covalent type crystal. The method used to measure the response and to determine the values of the pyroelectric constant are described. The experimental error in the values of the pyroelectric constant is estimated for each of the ambient temperatures at which the effect was measured. A new theory is developed to explain the temperature dependence observed. (Author)

Physical Research Lab., Space Tech. Labs., Inc., Los Angeles, Calif.
SUPERCONDUCTIVE PROPERTIES OF VACUUM DEPOSITED INDIUM FILMS, by Frederick W. Schmidlin, Arthur J. Learn and others. Rept. on Contract Nonr-2542(00). [1960] 73p. 6 refs. PRL-9-18; AD-231 160.
Order from LC mi$4.50, ph$12.30 PB 152 901

Contents:
Sample preparation
Measuring apparatus and technique
Steady-state response to a direct current
  Meaning of critical current
  Evidence of joule heat
  Dependence of critical current on temperature
  Dependence on width and thickness
Transient response to a suddenly applied current
Description of transition
Dependence of transition time on current and temperature
Dependence of transition time on film geometry and substrate
Dependence of cornering and isochronous currents on temperature and their significance

Raytheon Co., Waltham, Mass.
BETA SILICON CARBIDE, by D. M. Warschauer. Scientific rept. no. 2 on Contract AF 19(604)6133. 15 Sep 60, 41p. 9 refs. AFCRL-TN-60-1103.
Order from LC mi$3.30, ph$7.80 PB 152 628

The kinetics of gaseous-cracking of $SiCl_4$ and $SiHCl_4$ in the presence of H_2 to form SiC are discussed. Looped silicon carbide crystals obtained with this method of growth are described and illustrated. An attempt to control nucleation density and growth rate in the solution method by dilution with germanium has been tried and abandoned. The effect of variation of other growth parameters is reviewed. Progress with Hall and resistivity measurements is discussed. Determination of the temperature shift of the optical absorption edge in cubic material is almost complete. Two papers recently given are appended because they summarize the knowledge gained on some of this work to date. (Author) (See also PB 148 354)

Wayne State U. [Detroit, Mich.]
PREPARATION AND PROPERTIES OF CUPROUS OXIDE AND CUPROUS OXIDE PHOTOVOLTAIC CELLS, by Dan Trivich and Robert S. Toth. Technical rept. no. 4 (Final) on Contract [AF 18(600)481]. Aug 60, 32p. 25 refs. AFOSR TR-60-125; AD-245 116.
Order from LC mi$3.00, ph$6.30 PB 152 694

The electrodeposited cuprous oxide photovoltaic cells were found to be much less efficient for energy conversion than the thermal cells but they were considerably improved by a sulfiding process. The mechanism of the sulfide sensitization was shown to be due to a highly conducting surface film of cuprous sulfide which lowered the series resistance of the cells. The electrodeposited cuprous oxide had a very fine crystal size but the same crystal structure as the thermal cuprous oxide. The resistance of the electrolytic cuprous oxide was much higher than that of the thermal material, thus making it more susceptible to the sulfiding treatment. The visible and infrared spectra of the two types of cuprous oxide were similar except that the electrolytic material had additional absorption bands at 3.04 and 6.05μ. Ionic bombardment with hydrogen produced the desired front junctions on thermal cuprous oxide, and in doing so reduced the top surface to copper. The resulting cells had an efficiency of about 1% for the conversion of solar energy to electrical energy, considerably greater than that of the back-wall cells. Efforts were made to produce cuprous oxide in single crystal form. A successful method was developed, using a grain growth process at high temperature. The electrical conductivity of the single crystal cuprous oxide was measured at high temperatures and various oxygen pressures. At constant temperature, the conductivity varied with the 1/7th power of the oxygen pressure at not too low pressures. At constant oxygen pressure, the logarithm of the conductivity varied linearly with the reciprocal of the absolute temperature, and from these linear plots activation energies were calculated. (Author)

Theoretical Physics

Avco-Everett Research Lab., Mass.
MAGNETOHYDRODYNAMIC SHOCK WAVE IN A COLLISION-FREE PLASMA, by F. J. Fishman, A. R. Kantrowitz, and H. E. Petschek. Rept. on Contract Nonr-2524(00). Jan 60, 28p. 12 refs. Research rept. 85; AD-232 911.
Order from LC mi$2.70, ph$4.80 PB 152 912

In high temperature low density plasmas collisional relaxation becomes slow compared to other characteristic times (collision free plasma). It seems likely that under such circumstances more powerful dissipative mechanisms would appear and the understanding of these mechanisms is basic to the treatment of containment and flow problems. It is known that shock waves propagating perpendicular to a magnetic field can be much thinner than a mean free path, which implies that more powerful dissipative mechanisms must exist. An attempt is made to identify the dissipative mechanisms operative in a shock wave with randomized magnetohydrodynamic waves of large amplitude. The entropy production process is the scattering of waves on waves. The typical wave mean free path is comparable to an ion Larmor radius inside a shock front. The short mean free path for this scattering process implies that continuum magnetohydrodynamics can be applied in many cases even when the interparticle mean free path is quite large. Both the shock thickness and its dependence on the Alfvén Mach number obtained in this manner are in agreement with MAST shock tube experiments. (Author)

Brown U. Div. of Engineering, Providence, R. I.
THE EFFECT OF AN ALTERNATING ELECTRIC FIELD ON ELECTRON FLOW IN AN INHOMOGENEOUS PLASMA, by Lewis Wetzel. Rept. on Contract AF 19(604)4561. Aug 60, 26p. 9 refs. Scientific rept. no. AF 4561/9; AFCRL-TN-60-994; AD-245 206.
Order from LC mi$2.70, ph$4.80 PB 152 742

It is shown that the interaction between an alternating electric field and spatial inhomogeneities in a plasma

will produce perturbations of both the random diffusion of the electrons and the alternating current excited in the plasma by the applied field. The random diffusion is reduced in the direction of the field, the anisotropy being of the order of U_c/U_a, where U_c is the average energy gained by an electron from the field between collisions, and U_a is the random energy of the electron. The a. c. current is altered by an additional term proportional to the rate at which the gradient of the unperturbed electron density changes in the direction of the applied field. Of interest here is the possibility of induced currents transverse to the applied field. Numerical examples indicate that these effects will usually be quite small, but may become significant under suitable conditions. (Author)

Electron Tube and Microwave Lab., Calif. Inst. of Tech., Pasadena.
STUDY OF ELECTROMAGNETIC INTERACTION IN PLASMAS, by R. W. Gould and D. G. Dow. Quarterly progress rept. no. 1, 1 Dec 59-30 Apr 60, on Contract DA 36-039-sc-85317; Continuation of Contract DA 36-039-sc-78230. [1960] 15p. AD-242 179.
Order from LC mi$2.40, ph$3.30 PB 152 996

Further design considerations for the cyclotron orbit plasma oscillator are given including shaping of the magnetic field to produce the desired electron trajectories. Preliminary measurements on a hydrogen discharge tube show that the necessary electron density of $10^{11}cm^{-3}$ can be obtained with a discharge current of .650 amp. and electron temperature of $12000^{o}K$. The construction of a PIG discharge tube for high density plasma generation is proceeding simultaneously. (Author)

Michigan U., Ann Arbor.
THEORY OF PLASMAS, PART I, by R. K. Osborn. Rept. on Research on Particle Dynamics, Contract AF 33(616)5585. Aug 60, 69p. 16 refs. ARL Technical rept. 60-274, pt. 1.
Order from OTS $1.75 PB 171 336

This paper presents a portion of an attempt to develop, in u-space, a unified theory of plasmas - the main purpose being to localize points of difficulty or obscurity encountered in the deduction of a description of such systems. Within the context of non-relativistic particle dynamics, exact relations describing the particle and photon singlet densities are deduced - the relations for the particle densities being essentially those developed earlier by Brittin. It is then shown that the relations governing the particle densities are crudely reducible to Boltzmann's and/or Vlasov's equations in the sense of certain reasonably clearly stated, but ill-evaluated, approximations. The relation describing the photon singlet density is discussed in considerable detail, and a reduction to the conventional equation of photon transport is accomplished

Microwave Physics Lab., Sylvania Electric Products, Inc., Mountain View, Calif.
THE NONLINEAR INTERACTION OF AN ELECTROMAGNETIC WAVE WITH AN ANISOTROPIC PLASMA LAYER. PART I: THEORY OF HARMONIC GENERATION, by R. F. Whitmer and E. B. Barrett. Scientific rept. no. 2 on Investigation of Nonlinear Phenomena Associated with Ionized Plasmas, Contract AF 19(604)4083. 30 Aug 60, 36p. 13 refs. AFCRL-TN-60-990; AD-244 881.
Order from LC mi$3.00, ph$6.30 PB 152 633

The theory of electromagnetic wave propagation through an anisotropic ionized layer, including the effects of the nonlinear terms in the Boltzmann transport equation, is presented. The method of solution of the nonlinear equations involves an expansion of all of the dependent variables in a Fourier series in time. The differential equations describing wave propagation are then solved, for each frequency in the series, for plane wave propagation, including all of the reflections within the plasma layer. A solution in closed form has been obtained, under small signal conditions, for the field at the h-th harmonic in the Fourier series. A discussion of the properties of the wave at the second harmonic frequency as a function of the dc magnetic field strength, the electron density, the electron-neutral particle collision frequency, the field strength of the incident wave, and the thickness of the plasma layer is given. (Author)

Plasma Propulsion Lab., Republic Aviation Corp., Farmingdale, N. Y.
POWER SUPPLY DESIGN PARAMETER STUDY FOR ELECTROMAGNETIC DETONATIONS (PHASE I) by K. M. Foreman. Rept. on Contract AF 49(638)552. 31 Aug 60, 21p. 9 refs. PPL-TR-60-3; AFOSR TN-60-1198; AD-245 690.
Order from LC mi$2.70, ph$4.80 PB 152 955

The characteristics of an electrical power supply suitable for electromagnetically induced detonations are indicated. A parametric study of circuit constants for a single simple R-L-C series circuit shows that this type of power supply is inadequate to provide for all requirements of a propulsion device. However, a suitable pulse of current for laboratory demonstration purposes can be achieved with the following typical circuit constants: $L = 10^{-8}$ henries; $C = 3 \times 10^{-5}$ farads; $R = 10^{-2}$ ohms. Directions for future studies to satisfy practical energy release applications are speculated upon. (Author)

Technische Hochschule, Stuttgart (West Germany).
DEVELOPMENT OF A DIAGNOSTIC DEVICE FOR THE DETERMINATION OF MEAN EFFECTIVE TEMPERATURES IN PLASMAS USING SHOCK WAVE MEASUREMENTS, by E. Hisam and W. Bez. Interim rept. for 1 Jan-31 Dec 59 on Experimental Part, Contract AF 61(052)199. Feb 60, 52p. 41 refs. AD-235 859.
Order from LC mi$3.60, ph$9.30 PB 153 626

This report released for sale to the public 16 Jan 61.

A description is given of the development of a diagnostic plasma shock tube for the determination of mean effective temperatures in pulse discharges. The temperature and pressure in such a discharge is to be estimated from observations of the shock velocity in the tube. Methods are described of measuring the shock propagation velocity by using photocells. Required reproducibility of experiments is observed by using an image converter with effective exposure times

of approximately 10^{-7} sec. The extensive electronic equipment developed for this diagnostic method is discussed in detail. (Author)

Thermodynamics

Armour Research Foundation, Chicago, Ill.
THERMOPHYSICAL PROPERTIES OF SOLID MATERIALS. VOLUME I. ELEMENTS (MELTING TEMPERATURE ABOVE 1000°F), by Alexander Goldsmith, Thomas E. Waterman, and Harry J. Hirschhorn. Rept. for 1 July 57-31 Aug 60 on Thermophysical Data Consolidation, Contract AF 33(616)5212. Rev. Aug 60, 735p. WADC Technical rept. 58-476, Volume I. AD-247 193.
Order from OTS $8.00 PB 171 329-1

This report released for sale to the public 3 Jan 61.

Thermophysical property data, and their variation with temperature, are presented for a great number of solid materials, based on literature published during the period 1940-1957. Each reported value is shown and annotated, and recommended "most probable value" curves are given. Only those melting above 1000°F are included. Properties covered include the following: Melting point, Density, Latent heats, Specific heat, Thermal conductivity, Thermal diffusivity, Emissivity, Reflectivity, Thermal expansion, Vapor pressure, and Electric resistivity. (Author)

Arnold Engineering Development Center, Tullahoma, Tenn.
AN ANALYSIS OF SLUG-TYPE CALORIMETERS FOR MEASURING HEAT TRANSFER FROM EXHAUST GASES, by J. C. Westkaemper. Rept. on ARO, Inc., Contract AF 40(600)800 S/A 11(60-110). Nov 60, 44p. 4 refs. AEDC TN-60-202; AD-245 524.
Order from LC mi$3.30, ph$7.80 PB 152 966

Insulated-mass, slug-type calorimeters were investigated for use in measuring convective heating produced by rocket exhaust gases which circulate in the base region of a missile. The necessity of designing and installing calorimeters which do not alter the normal thermodynamic conditions is discussed. Analysis is made of various sources of error in slug calorimeters, particularly extraneous heat gain or loss. A numerical method is used to compute transient temperature distributions in porcelain-cement-type insulation; conduction errors are calculated for various insulation configurations using these distributions. A method for minimizing such errors is described. (Author)

Florida U. Engineering and Industrial Experiment Station, Gainesville.
INELASTIC SCATTERING OF NEGATIVE IONS IN OXYGEN, by E. E. Muschlitz, Jr. and C. E. Baker. Technical rept. no. 9 on A Study of Negative Gaseous Ions, Contract Nonr-580(01). Dec 59, 20p. 15 refs; AD-232 561.
Order from LC mi$2.40, ph$3.30 PB 152 137

Measurements of the inelastic cross sections for the scattering of O^-, O_2^-, H^-, and OH^- ions in oxygen gas in the ion-energy range 4-400ev are presented. An improved collision chamber used for these measurements is described. The results are interpreted in terms of the possible types of inelastic collisions taking place: (1) electron detachment, (2) electron exchange, and (3) ion-molecule reaction. It is shown by means of retarding potential analyses that the energy of the electrons produced in electron detachment collisions is considerably higher than thermal energy, perhaps as much as several ev at the higher incident ion energies. (Author)

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
THE TRANSPORT PROPERTIES OF A FULLY IONIZED GAS. I. A QUANTAL STUDY OF DIFFUSION AND VISCOSITY CROSS SECTIONS FOR A SCREENED COULOMB POTENTIAL, by M. R. C. McDowell and G. Peach (Royal Holloway Coll., U. of London). Technical rept. no. 5 on Contract AF 18(600)1524. 1 Sep 60, 61p. 32 refs. AFOSR-TN-60-945; AD-245 157.
Order from LC mi$3.90, ph$10.80 PB 152 789

Born's approximation and the Massey-Mohr approximation are used to obtain quantum mechanical values of the diffusion and viscosity cross section Q_D and Q_η for a screened coulomb potential. The parameters are chosen to represent an ionized gas with $10^8 \leq n_e \leq 10^{18}$, n_e being the electron density, and $5\times10^3 \leq T_e \leq 10^7$ °K, T_e being the temperature. The scattering phase shifts are also evaluated and compared with those obtained from direct numerical integration of the scattering equation. Born's approximation to the phase shift is used in a Faxén-Holtsmark type analysis to give more accurate values of the cross sections at low T and large n_e. The results are used to discuss the behavior of the electrical conductivity of a fully ionized gas. At high temperatures they are in close agreement with earlier workers, but predict a different temperature dependence if $(\frac{T}{n_e})$ is small. (Author)

Massachusetts Inst. of Tech., Cambridge.
EVALUATION OF FREON 12 PROPERTIES AND THE GENERALIZED FLUID PROPERTIES NEAR THE CRITICAL POINT, by P. C. Calcaterra. Technical rept. no. 3 on Contract Nonr-1841(14). Mar 60, 39p. 6 refs. DSR no. 7484; AD-242 361.
Order from LC mi$3.00, ph$6.30 PB 150 036

To correlate the heat transfer characteristics of fluids near and above the critical point, the values of the fluid properties must be known over this range. This report discusses in detail how the values of the density, viscosity, thermal conductivity, and the specific heat are evaluated for Freon 12 at 600 psia and over the temperature range of 140°F to 400°F. Curves are presented for determining the values of these properties throughout the critical region for Freon 12 and for fluids in general. (Author)

Massachusetts Inst. of Tech., Cambridge.
HEAT TRANSFER TO FLUIDS AT SUPERCRITICAL PRESSURES, by J. C. Chato. Technical rept. no. 4 (Final) on Investigation of Fluids for Power Cycles, Contract Nonr-1841(14). 31 Mar 60, 15p. DSR no. 7484; AD-242 362.
Order from LC mi$2.40, ph$3.30 PB 150 035

Contents:
Table of enthalpies of Refrigerant-12 at 610 psia.
Heat transfer results of experimental runs

Wave Propagation

Air Force [Cambridge Research Labs.] Bedford, Mass.
THE AIRBORNE SURVEY OF ICE CAPS AT RADIO FREQUENCIES, by Noel Stone. Aug 60, 20p. 10 refs. ERD-CRRC-TR-171; AD-245 724.
Order from LC mi$2.40, ph$3.30 PB 152 987

The theoretical feasibility of an aerial survey of ice cap thickness is explored by computing (1) the scattered field intensity from a snow-air surface, (2) the absorptive transmission loss in snow and ice and (3) the net return from the ground beneath the ice. The air-ice reflection loss is 10 db, the scattering loss, around 20 db. The absorption at 300 Mc is 0.11 db./meter in ice, 0.035 db./meter in snow. It is shown that an aircraft may in theory make a survey under such conditions. (Author)

Canterbury U. (New Zealand).
STUDIES OF PARTIAL REFLECTIONS FROM THE LOWER IONOSPHERE, by J. B. Gregory. Final rept. on Contract Nonr-2651(00). 1 Mar 60, 10p. 5 refs. AD-236 967.
Order from LC mi$1.80, ph$1.80 PB 147 558

Studies of partial reflections of radio waves at a fixed frequency of 1.75 mc were carried out in 2 programmes. These programmes comprised an analysis of a year's routine observations of the lower ionosphere, and the instrumentation of a method of measuring the electron concentration of the lower ionosphere. Results are summarized. (Author)

Center for Radiophysics and Space Research, Cornell U., Ithaca, N. Y.
AN ANALYSIS OF THE EFFECT OF AN IMPOSED MAGNETIC FIELD ON THE SPECTRUM OF INCOHERENT SCATTERING, by T. Laaspere. Scientific rept. no. 4 on Contract AF 19(604)6158. 15 July 60, 79p. 19 refs. Research rept. RS 15; ARPA Order no. 106-60; AFCRL TN-60-790; AD-244 557.
Order from LC mi$4.50, ph$12.30 PB 152 523

The problem of incoherent scattering in the presence of a constant external magnetic field is analyzed. It is found that if the radar beam is directed normal to the magnetic field, its presence can have a profound effect on the spectrum of scattering. It is also found that the gyromagnetic frequency of the charged particles plays an important role in the whole problem.

Institute of Mathematical Sciences, New York U., N. Y.
THE SHIFT OF THE SHADOW BOUNDARY AND THE SCATTERING CROSS SECTION OF AN OPAQUE OBJECT, by S. I. Rubinow and Joseph B. Keller. Rept. on Contracts AF 19(604)5238 and Nonr-263(30). Sep 60, 25p. 6 refs. Research rept. no. EM-162; AFCRL-TN-60-973; AD-245 623.
Order from LC mi$2.70, ph$4.80 PB 152 842

Because of the discrepancy in the proportionality constant for hard cylinders that exists between the works of Rice and Artmann, the shift for the circular cylinder has been redetermined and it was found that a was the same as for the parabolic cylinder as determined by Rice. In addition, the shift has been determined for circular cylinders for fields which satisfy an impedance boundary condition.

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MILLSTONE HILL RADAR STATION: LUNAR COMMUNICATION TEST SUMMARY, 1959, by Paul B. Sebring. Rept. on Contract AF 19(604)7400. 30 Sep 60, 10p. 2 refs. Rept. no. 30G-0011; AD-244 207.
Order from LC mi$1.80, ph$1.80 PB 152 466

This report summarizes the operating parameters and the results obtained on several UHF "moon-bounce" voice communication trials between the Millstone Station and other activities having large steerable antennas. As predicted, most multi-path distortion problems arising from the large physical size of the moon were minimized by the use of single side-band transmission. The series culminated in the very successful test of a voice circuit from Millstone to the 250-foot diameter radio telescope at the Jodrell Bank Experimental Station in England. A voice-to-background level ratio of 17 db was readily obtainable with better than telephone quality. Simultaneous recordings of the transmitted and reflected voice signal were made at Millstone. Transmission from Jodrell back to Millstone was accomplished over an excellent telephone circuit which included the transatlantic cable. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
TWILIGHT REGION PROPAGATION OF SHORT RADIO WAVES BY MODES CONTAINED IN THE NORMAL AIR, by T. J. Carroll and R. M. Ring. Summary technical rept. on Contract AF 19(122)458. 31 Oct 58, 210p. 73 refs. Technical rept. no. 190; AD-210 005.
Order from LC mi$9.30, ph$31.80 PB 149 740

An introductory history outlines the progress of the last decade in understanding the weak but omnipresent and useful fields of short radio waves well beyond the horizon as guided wave modes contained in the dielectric atmosphere by partial reflection. After an intuitive exposition of the basic idea and main results, the equations are briefly derived for the modes contained in a horizontally stratified dielectric atmosphere above a perfectly reflecting curved earth. The idealized profile of refractive index is assumed to have essentially the gradient determined by gravity and the gas laws and to be terminated in free space above the troposphere or stratosphere.

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
ON THE ELECTROMAGNETIC PROPERTIES OF WEDGES AND CONES WITH LINEARLY VARYING SURFACE IMPEDANCE, by Leopold B. Felsen. Rept. on Contract AF 19(604)4143. 14 Apr 60, 91p. 24 refs. Research rept. R-736-59; PIB-664; AFCRL-TN-60-978
Order from LC mi$5.40, ph$15.30 PB 153 088

The electromagnetic behavior of wedge and cone surfaces having a linearly varying surface impedance (admittance) is analyzed. The impedance (admittance) variation is such as to render the resulting (two dimensional) boundary value problems separable. Alternative representations of the formal Green's function solutions are obtained and their different utility is emphasized. For certain reactive ranges of surface impedance, a new type of surface wave is found to exist which can serve as a model for the study of radiation from a tapered surface wave antenna. An application is made to the approximate analysis of the radiation properties of a surface of finite length having a linear reactance taper, inserted between a feeding surface waveguide with constant reactance, and a perfectly conducting plane which serves as a termination. An analysis of the scattering properties of a wedge with a linearly varying surface impedance is also carried out An asymptotic (far field) evaluation of the formal solution yields a decomposition into geometric-optical, diffraction, and transition effects, whose dependence on the rate of surface impedance variation is made evident. (Author)

Motorola, Inc., Phoenix, Ariz.
ELECTROMAGNETIC PROPAGATION STUDY, by John H. Thess. Final rept. for 1 June 57-31 Dec 59 on Contract DA 36-039-sc-74841. [1960] 58p. AD-242 302.
Order from LC mi$3.60, ph$9.30 PB 152 993

This study covers the investigation of the propagational and meteorological effects on the accuracy of terrestrial distance measurements obtained utilizing an integrated electronic distance measuring system comprising two Radar Set AN/PPN-13(XE-2) equipments. The following modes of propagation were investigated both theoretically and experimentally: (a) multipath propagation over land and water paths; (b) ground wave transmission supported by a presentation of attenuation theory; (c) propagation over obstructed paths including a hill of large radius-of-curvature, a knife-edged mountain ridge, and a heavily foliated citrus orchard; (d) propagational limitations of operation over extremely long ranges (139 miles), including a method for correction of propagation velocity utilizing intermediate weather data and the use of circular polarization to reduce local radar type echoes; and (e) transmission through rain. Correction of propagation velocity along a path using the average refractive index, as calculated from air temperature, pressure, and humidity measurements, is greatly simplified by a nomogram which is included. A nomogram for calculating the knife-edge shadow loss is also included. (Author) (See also PB 149 371)

National Bureau of Standards, Boulder, Colo.
QUARTERLY RADIO NOISE DATA, JUNE, JULY, AUGUST 1960, by W. Q. Crichlow, R. T. Disney, and M. A. Jenkins. 4 Nov 60, 68p. 11 refs. Technical note no. 18-7.
Order from OTS $1.75 PB 151 377-7
See also PB 151 377-6

Oxford U. (Gt. Brit.).
ELECTRO-MAGNETIC RADIATION IN ANISOTROPIC MEDIA, by Herwig Kogelnik. Technical note no. 6 on Contract AF 61(514)1183. June 60, 72p. 54 refs. AFOSR-TN-60-1042; AD-244 283.
Order from LC mi$4.50, ph$12.30 PB 152 418

This report contains a brief survey of the material constants of anisotropic media like ionized gases, ferrites, etc. The conditions are studied which the elements of the tensor material constants of lossy (and lossless) media have to satisfy. Plane electro-magnetic waves in unbounded, lossy (and lossless) anisotropic media are investigated. A general method is presented of solving radiation problems in unbounded (not necessarily lossless) homogeneous, anisotropic media, which involves dyadic Green's functions and their spatial Fourier transforms (which are defined). The method is applied to the study of the waves excited by oscillating dipoles arranged in a plane in an anisotropic medium - and particularly in a plasma. The power radiated by an elementary electric dipole (Hertzian dipole) in a lossless plasma is studied in greater detail.

Plasmadyne Corp., Santa Ana, Calif.
INVESTIGATION OF THE PRODUCTION OF MILLIMETER AND SUB-MILLIMETER ELECTROMAGNETIC WAVES, by Ralph W. Waniek. Final rept. for 1 July 59-30 June 60 on Contract AF 19(604)5961. 1 Aug 60, 111p. 2 refs. FR080-5961; AFCRL TR-60-185; AD-245 497.
Order from LC mi$6.00, ph$18.30 PB 152 929

The broad theoretical problem studied covers the production of radiation by the deceleration of charged particles (bremsstrahlung) in high magnetic fields. After an introductory section detailing the characteristics of the bremsstrahlung, a section is devoted to the consideration of coherence problems in which the importance of choosing proper conditions for injecting the particles into the field is pointed out. The remainder of the theoretical section is devoted to an investigation of the particular problem of choosing the proper injection conditions. Two sections dealing with the forbidden zones and trajectories are preceded and introduced by a section in which the necessary background theory is developed from first principles. (Author)

Sindel S. p. A., Rome (Italy).
MICROWAVE INVESTIGATION OF THE DIELECTRIC WAVEGUIDE PROPAGATION BY MAGNETO-IONIC DUCTS, by D. Formato and A. Gilardini. Technical summary rept. no. 1 on Contract AF 61(052)145. 30 Apr 60, 39p. 5 refs. AFCRL TN-60-983; AD-245 928.
Order from LC mi$3.00, ph$6.30 PB 152 963

Magneto-ionic propagation in a cylindrical plasma of circular cross-section has been investigated theoretically and experimentally in a straight and in a curvilinear geometry. The microwave signal transmitted through a plasma generated from an RF discharge in neon has been measured as a function of the discharge power, of the magnetic field, of the gas pressure and of the pitch angle of the helical winding, used as a mode-selective input. The experimental results have

been explained by the theory of the magneto-ionic propagation in a ionized medium with a plasma frequency larger than the signal frequency. The theoretical results and their implications on the ionospheric interpretation of whistler atmospheric behaviour are also discussed. (Author)

Washington U. [Seattle] Coll. of Engineering.
THE VARIATIONAL METHOD FOR EVALUATION OF SCATTERING OF ELECTROMAGNETIC WAVES BY OBSTACLES, I. THEORY, by Richard B. Kieburtz, Akira Ishimaru, and Gedalia Held. Technical rept. no. 45 on Contract AF 19(604)4098. Aug 60, 49p. 10 refs. AFCRL TN-60-961.
Order from LC mi$3.30, ph$7.80 PB 152 981

This report presents a generalized variational method for calculation of equivalent circuits and scattering coefficients for scattering of electro-magnetic waves by obstacles. The method in this form can be applied both to waveguide problems and to scattering of plane electromagnetic waves by obstacles in free space. The development given here applies directly to waveguides and to periodic infinite arrays of identical obstacles, but the extension to single obstacles or finite arrays is not difficult in principle, requiring only that the Green's function be put into a suitable form. The fundamental limitations of the variational method are clearly defined from this new formulation. In particular, it is shown how the variational method may be used to calculate scattering coefficients when more than one propagating mode is excited by the obstacle, and how to obtain an equivalent circuit representation of an obstacle without symmetry along the direction of propagation. It is shown that it is always possible to obtain both upper and lower bounds on a parameter calculated from a variational expression, although in certain cases, one of the bounds may be easier to obtain than the other. (Author)

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

Columbia U. School of Engineering, New York.
ON ASSURING SAFETY IN DESTRUCTIVE TESTING, by Peter Frank. Technical rept. no. 7 on Contract Nonr-266(55). 6 Jan 60, 7p. AD-231 844.
Order from LC mi$1.80, ph$1.80 PB 152 897

The use of items which are very dangerous if defective is considered. The following procedure for deciding whether to use the items is considered. A surveillance sample of size N_S is tested; if none are defective, the items (exactly N) are used; otherwise, none are used.

Wayne State U., Detroit, Mich.
RESEARCH IN MACHINE TRANSLATION. RUSSIAN INTO ENGLISH: MATHEMATICAL TEXT, by Harry H. Josselson and Arvid W. Jacobson. Rept. on Contract Nonr-2562(00). [31 July 59] 50p. AD-226 834.
Order from LC mi$3.30, ph$7.80 PB 149 685

Contents:
Linguistic problems associated with machine translation
Logical problems
The immediate constituent model
The transformation model
Computer considerations
Analysis of multiple meaning in mathematical text
Preparation of text for automatic data processing

Information Theory

Lincoln Lab., Mass. Inst. of Tech., Lexington.
CONCEPTS OF AUTOMATIC DATA STORAGE AND RETRIEVAL IN THE SIMPLEX SYSTEM, by C. W. Uskavitch. Rept. on Contract AF 19(604)7400. 17 Oct 60, 67p. 12 refs. 22G-0053; AD-245 472.
Order from LC mi$3.90, ph$10.80 PB 152 787

Five guiding principles are inherent in the idea of a Simplex system for the Field Army: (1) the system should be independent of organizational structure; (2) it must handle large quantities of information with minimum delays; (3) it should provide service to as many units as possible; (4) it must be easily modified; and (5) the system must fulfill the operational requirements of the Field Army. From these principles are derived the more concrete, but general, concepts required for design of the data storage and retrieval system. These concepts include such ideas as minimum human intervention, maximum utilization of all equipments, modular construction, a common code for all information, and special-purpose devices for such functions as error correction and security coding. Although these concepts are sufficient to provide a general conception of the system, they are not detailed enough to show that implementation is feasible and, if feasible, which particular implementation is best. Therefore, a set of "black boxes" are postulated to provide an initial design of an apparently feasible storage and retrieval system. Each box is defined functionally in detail, and a possible implementation technique is indicated. This design is not proposed for implementation but has been derived as a first step in the design process. By suitable study of this initial design, seeking deficiencies and making improvements, a final design may hopefully be refined which will provide the best system for the Field Army. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ERROR STATISTICS ON DUAL DATA CIRCUITS FROM KINGSTON, NEW YORK TO CAPE CANAVERAL, FLORIDA, by E. J. Hofmann. Rept. on Contract AF 19(604)7400. 20 Oct 60, 38p. 7 refs. 25G-0005; AD-245 991.
Order from LC mi$3.00, ph$6.30 PB 152 933

Both bit error rates and word error rates are shown, and their temporal and amplitude characteristics are examined. It is shown that digital errors are of a burst nature, both within a word and over many words. Distributions are given for the number of bits in error in a word error, duration of bursts, and the probability of continuous error and error-free periods. Conversion probabilities from mark to space and space to mark are given. The effectiveness of simple parity as an error-checking device is also evaluated. (Author)

Photographic Equipment

Army Signal Research and Development Lab., Fort Monmouth, N. J.
DARKROOM, PHOTOGRAPHIC, PORTABLE ES-29 (XE-3) by P. Townsend. 14 July 60, 31p. USASRDL Test rept. 1459, supplement no. 1.
Order from LC mi$3.00, ph$6.30 PB 152 564

Darkroom, Photographic, Portable ES-29 (XE-3), formerly ES-29 (XE-1), which was modified and installed in a new shelter, has been subjected to a complete series of acceptance tests and has been found satisfactory for release for service tests. (Author)

Army Signal Research and Development Lab., Fort Monmouth, N. J.
EVALUATION OF 70MM CONTINUOUS LAND PROCESSOR, by L. D. Goldfarb. 2 May 60, 20p. USASRDL Test rept. 1479.
Order from LC mi$2.40, ph$3.30 PB 152 565

The 70mm Continuous Land Processor is a portable film processing unit capable of rapid processing exposed 70mm negatives from the cassette used in Camera KE-4 and producing either positive paper prints or positive transparencies at a rate of two to six feet per minute. Testing of the processor is discussed. In general the processor is in accordance with the Technical Requirements. (Author)

Army Signal Research and Development Lab., Fort Monmouth, N. J.
PROJECTION SYSTEM FOR HIGH AMBIENT LIGHT CONDITIONS, by Dieter P. Paris. 25 June 59, 12p. USASRDL Test rept. 1473; AD-220 673..
Order from LC mi$2.40, ph$3.30 PB 152 997

A projection system was tested which permits projection under high ambient light conditions. The system is designed so that the screen reflects the ambient light onto a mat absorbing surface thus preventing it from reaching the eyes of audience. The test showed that with an added illumination of 200 footlamberts the contrast of a projected slide dropped only from 12:1 to 5:1. (Author)

ITT Labs., Fort Wayne, Ind.
HIGH-SPEED IMAGE SHUTTER UNIT, by Louis F. Mayle. Rept. on Research on Particle Dynamics, Contract AF 33(616)6143. Apr 60, 62p. ITT rept. serial 3029; WADD Technical rept. 60-216; AD-239 486.
Order from OTS $1.75 PB 171 197

The description, theory, and operating procedure for the High-Speed Image Shutter Unit are given. With this equipment up to 12 pictures of a self-illuminating event (i.e. an exploding wire or arc) may be taken sequentially at extremely fast exposures with no intervening time between pictures. Pulsed image tubes are employed as electronic shutters. Timing accuracy, resolution, and light sensivity are considered, and calculations are presented. Included are schematic and wiring diagrams of the equipment, drawings for fabricating the image tube housing and 5 photographs. (Author)

MISCELLANEOUS

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Feb 61.
Order from OTS $1.25, $10.00/year PB 171 315

Contents:
Articles:
The Determination of Gases in Metals, by G. A. Picklo, Jr.
Structure of Vacuum-Deposited Germanium Films on Amorphous Quartz, by J. E. Davey
Tropospheric Burdens of Gross Fission Products, by L. B. Lockhart, Jr.
Scientific program:
Chemistry: Photodegradation of poly-α-methylstyrene by near ultraviolet light in vacuum at 27°C and 115°C. Characteristic functions and parameters in the theory of hydrogen overpotential
Mechanics: Interpreting lower yield point plastic flow in dynamic testing of mild steel. Beam deflection problems solved by use of the loading diagram
Metallurgy and Ceramics: Refined optical technique and apparatus for high-temperature strain measurements. Effect of hydrogen absorption and desorption on the ultrasonic velocities and hardness of palladium. Temperature dependence of the surface tensions of liquid metals. Effect of interference elements on the determination of ferrous iron in iron compounds
Nuclear and Atomic Physics: Penetration of electromagnetic waves into ionized gases
Solid-State Physics: Mylar film dosimetry. Miniaturized thermoluminescent dosimeter. Effect of pressure on F-center luminescence
Sound: Comparison of deep sea velocity meter with Nansen bottle operations during 1960
Supporting Techniques: A Beta Calculator for Graphic Displays

ATOMIC ENERGY COMMISSION REPORTS

Reports may be purchased in accordance with instructions on the inside front cover of the U. S. GOVERNMENT RESEARCH REPORTS. As PB numbers are not indicated, order by series and number. These reports may also be consulted at any AEC Depository Library. A list of these libraries may be obtained from the U. S. Department of Commerce, Office of Technical Services, Washington 25, D. C.

Reproduction in whole or part of any report listed herein is encouraged by the U. S. Atomic Energy Commission, subject to the approval of authors or originating sites. General inquiries from the industrial press about AEC-developed information should be directed to the Industrial Information Branch, Atomic Energy Commission, Washington 25, D. C.

Biology and Medicine

Fifth annual meeting of the bio-assay and analytical chemistry group, Gatlinburg, Tennessee from October 1-2, 1959, by K. Z. Morgan and others. Oak Ridge Natl nal Laboratory, Health Physics Division, Oak Ridge, Tenn. Nov 60. 106p. Order from OTS. $2.25. TID-7591

The origin of life on earth and elsewhere. II, by M. Calvin. University of California, Lawrence Radiation Laboratory, Berkeley, Calif. Oct 60. Contract W-7405-eng-48. 41p. Order from OTS. $1.00. UCRL-9440

Chemistry

Uranium hexafluoride isotopic measurements using an interpolative method, by G. F. Kauffman and N. F. Christopher. Goodyear Atomic Corporation, Portsmouth, Ohio. Nov 60. Contract AT-(33-2)-1. 15p. Order from OTS. 50 cents. GAT-291

The chemistry, purification and metallurgy of plutonium, by C. A. Thomas and others. Metallurgical Laboratory, Chicago University, Chicago, Ill. Dec 44. Decl. March 1, 1960. 539p. Report consists of two books. Order from OTS. Total price $5.50. MUC-JCW-223 (Book 1 & 2)

Critical constants of diphenyl and the terphenyls, by H. Mandel and N. Ewbank. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Dec 60. Contract AT(11-1)-GEN-8. 33p. Order from OTS. $1.00. NAA-SR-5129

Lithium and lithium hydride chemical and physical properties. A literature search, by T. F. Davis. Office of Technical Information Extension, Oak Ridge, Tenn. Nov 60. 26p. Order from OTS. 50 cents. TID-3558

Nonequilibrium thermodynamic theory for concentration profiles in liquid extraction, by A. Hennico and T. Vermeulen. University of California. Lawrence Radiation Laboratory, Berkeley, Calif. Sep 60. Contract W-7405-eng-48. 56p. Order from OTS. $1.25. UCRL-9415

Analytical methods in the beryllium program, by J. M. Googin. Union Carbide Nuclear Company, Division of Union Carbide Corporation, Y-12 Plant, Oak Ridge, Tenn. Dec 60. Contract W-7405-eng-26. 12p. Order from OTS. 50 cents. Y-1324

Beryllium chip processing, by Z. L. Ardary and others. Union Carbide Nuclear Company, Division of Union Carbide Corporation, Y-12 Plant, Oak Ridge, Tenn. Dec 60. 44p. Order from OTS. $1.00. Y-1328

Chemical Separations Processes for Plutonium and Uranium

Salt-phase chlorination of reactor fuels. II. ARCO process definition and scoping studies, by E.M. Vander Wall and others. Phillips Petroleum Co. Atomic Energy Division, Idaho Falls, Idaho. Oct 60. Contract AT(10-1)-205. 43p. Order from OTS. $1.00. IDO-14525

Reprocessing of thorium-uranium fuels by liquid metal extraction, by R. E. Johnson and J. D. Chilton. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Dec 60. Contract AT(11-1)-GEN-8. 19p. Order from OTS. 50 cents. NAA-SR-5506

Controlled Thermonuclear Processes

Stability of a diffuse hollow-core toroidal pinch, by B. R. Suydam. The University of California. Los Alamos Scientific Laboratory, Los Alamos, N. Mex. Oct 60. Contract W-7405-ENG-36. 17p. Order from OTS. 50 cents. LAMS-2477

Controlled thermonuclear processes. A literature search, by R. L. Scott and S. F. Lanier. Office of Technical Information Extension, Oak Ridge, Tenn. Nov 60. 104p. Order from OTS. $2.25. TID-3557

Engineering and Equipment

Thermoelectric refrigerator for the line recorder mass spectrometer (Theoretical design), by P. I. Davis. Goodyear Atomic Corporatinn, Portsmouth, Ohio. Nov 60. Contract AT(33-2)-1. 24p. Order from OTS. 50 cents. GAT-365

Health and Safety

Shock tube studies of the effects of sharp-rising, long-duration overpressures on biological systems. Progress report. by D. R. Richmond and others. The Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex. Mar 59. Contract AT(29-1)-1242. 30p. Order from OTS. 75 cents. TID-6056

Sixth AEC air cleaning conference, July 7-9, 1959. Sponsored by U. S. Atomic Energy Commission, Division of Reactor Development, Washinton, D. C. and Harvard Air Cleaning Laboratory, and Health and Safety Division, Idaho Operations Office, Idaho Falls, Idaho. 1959. 388p. Order from OTS. $4.00. TID-7593

Further contributions on gross beta radioactivity of biological and related samples at the Eniwetok Proving Ground, 1952-1958, by K. Bonham. University of Washington, Laboratory of Radiation Biology, Seattle, Wash. Dec 59. Contract AT(45-1)-540. 41p. Order from OTS. $1.25. UWFL-63

Instruments

Pressure and temperature instrumentation for dynamic measurements in the KEWB program. A summary report, by S. P. Harris and C. F. Bumpus, Jr. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Nov 60. Contract AT(11-1)-GEN-8. 77p. Order from OTS. $2.00. NAA-SR-4709

Design and construction of a unit for measuring metal skin temperatures. Phase I: Theoretical analysis and design for Sandia Corporation. Covering work performed from February 1956 through April 1956. Detroit Controls Corporation, Research Department, Redwood City, Calif. Dec 60. 47p. Order from OTS. $1.50. SC-4461(RR)

Interim report on development of design criteria for relays. This report covers the period 1 February to 31 March 1960. Oklahoma State University, School of Electrical Engineering, Stillwater, Okla. Oct 60. 66p. Order from OTS. $1.75. SC-4466(RR)

Bibliography on semiconductor nuclear radiation detectors, by J. L. Blankenship. Oak Ridge National Laboratory, Instrumentation and Controls Division, Oak Ridge, Tenn. Dec 60. 14p. Order from OTS. 50 cents. TID-3907

Isotopes—Industrial Technology

The technology and applications of large fission product beta sources. Radiation Applications Inc., New York, N. Y. [1959?] 38p. Order from LC. Mi $3.00, ph $6.30. NYO-2500

Study of the industrial potential of radioisotopic methods in the textile industry, April 1959 - June 1960, by L. Rebenfeld and H. J. White, Jr. Textile Research Institite, Princeton, N. J. July 60. Contract AT(30-1)-2365. 26p. Order from OTS. 50 cents. NYO-2640

The development of a beta-ray particle size analyzer. April 1959 - May 1960, by S. Z. Lewin and others. Evans Research and Development Corporation, New York, N. Y. Oct 60. Contract AT(30-1)-2372. 42p. Order from OTS. $1.25. NYO-2655

Potential applications of radioisotopes to the mining preparation, transportation, storage, handling, and use of coal. Final report, by H. J. Rose and others. Bituminous Coal Research, Inc., Pittsburgh, Pa. Nov 60. Contract AT(30-1)-2311. 233p. Order from OTS. $3.00. NYO-2859

The technology and applications of large fission product beta sources. Quarterly report for period ending March 31, 1960. Radiation Applications Inc., New York, N. Y. 1960. Contract AT(30-1)-2186. 16p. Order from LC. Mi $2.40, ph $3.30. TID-5869

The applications of isotopes to industrial problems. Progress report no. 13 for period March 16 to April 15, 1960, by F. F. Rieke. University of Chicago, Chicago Midway Laboratories, Chicago, Ill. Apr 60. Contract AT(11-1)-712. 12p. Order from LC. Mi $2.40, ph $3.30. TID-5905

The applications of isotopes to industrial problems. Progress report no. 14 for April 16 to May 16, 1960, by F. F. Rieke. University of Chicago. Chicago Midway Laboratories, Chicago, Ill. May 60. Contract AT(11-1)-712. 17p. Order from LC. Mi $2.40, ph $3.30. TID-5969

Isotopic method for age determinations of industrial products. Monthly progress letter for April 1960, T. C. Gregson and L. B. Bangs. Goodyear Tire and Rubber Co., Akron, Ohio. 1960. Contract AT(11-1)-719. 3p. Order from LC. Mi $1.80, ph $1.80. TID-6060

Study of the industrial potential of radioisotopic methods in the synthetic detergent and soap industry. Final report March 1 to November 30, 1959, by C. W. Stanely. Office of Isotopes Development, U. S. Atomic Energy Commission, Washington 25, D. C. 1959. Contract AT(40-1)-2514. 52p. Order from OTS. $1.25. TID-6088

Gamma gaging in chemical plant instrumentation, by J. A. Williamson and F. M. Teetzel. National Lead Co. of Ohio, Cincinnati, Ohio. July 58. 30p. Order from LC. Mi $2.70, ph $4.80. TID-6109

Radioisotope experiments for the chemistry curriculum, by A. G. Schrodt and others. Nuclear Chicago Corporation, Chicago, Ill. Aug 60. Contract AT(11-1)-738. 162p. Order from OTS. $2.00. TID-6374

Radioisotope experiments for the chemistry curriculum. Instructor notes. Nuclear-Chicago, Corporation, Chicago, Ill. Aug 60. Contract AT(11-1)-738. 60p. Order from OTS. $1.00. TID-6375

Industrial applicability of low level counting, by M. A. Greenfield and R. L. Koontz. E. H. Plesset Associates, Inc., Los Angeles, Calif. June 59. Contract AT(49-2)-1372. 54p. Order from OTS. $1.50. WASH-1020

Metals, Ceramics, and Materials

Heat transfer fluids for fuel element cans, by L. Brewer. General Atomic Division, General Dynamics Corporation, San Diego, Calif. Aug 59. Contract AT(04-3)-314. 4p. Order from LC. Mi $1.80, ph $1.80. AECU-4537

Corrosion of Inor-8 and Inconel dissolver components of the fluoride-volatility process, by F. W. Fink. Battelle Memorial Institute, Columbus, Ohio. Dec 59. 50p. Order from LC. Mi $3.30, ph $7.80. AECU-4633

Study of factors influencing ductility of iron--aluminum alloys. Monthly letter report no. 10 covering period March 15, 1959 to March 15, 1960, by F. C. Perkins and J. F. Nachman. University of Denver. Denver Research Institute, Denver, Colo. Feb 60. Contract AT-(11-1)-742. 4p. Order from LC. Mi $1.80, ph $1.80. AECU-4698

Low cycle fatigue of pressure vessel materials. Interim Technical report no. 5, by G. Sachs and others. Syracuse University, Metallurgical Research Laboratories, New York, N. Y. Jan 60. Contract AT(30-1)-2141. 47p. Order from LC. Mi $3.30, ph $7.80. AECU-4728

Studies of corrosion by molten zinc and cadmium systems, by J. P. DeKany and others. Argonne National Laboratory, Argonne, Ill. Oct 60. Contract W-31-109-eng-38. 44p. Order from OTS. $1.00. ANL-6243

Specifications and fabrication procedures for SM-1A core II stationary fuel elements. Alco Products, Inc., Schenectady, N. Y. May 60. Contract AT(30-3)-326. 91p. Order from LC. Mi $5.40, ph $15.30. APAE-Memo-258

Fundamental alloy development studies. Quarterly progress report no. 8 for August 1, 1957-October 31, 1957, by C. E. Lundin and D. T. Klodt. University of Denver. Denver Research Institute, Denver, Colo. Nov 57. Decl. with deletions November 4, 1959. 34p. Order from LC. Mi $3.00, ph $6.30. APEX-349(Del.)

Phase diagram studies. Progress report no. 2 for April 1 - June 30, 1958, by R. F. Domagala. Illinois Institute of Technology, Armour Research Foundation, Chicago, Ill. July 58. Decl. June 11, 1958. Contracts AF33(600)-38062 and AT(11-1)-171. 15p. Order from LC. Mi $2.40, ph $3.30. APEX-420

Development of metallic uranium fuel elements of improved irradiation stability. Semiannual progress report no. 1. Advanced Technology Laboratories. Division of American-Standard, Mountain View, Calif. Dec 59. Contract AT(04-3)-250. 45p. Order from LC. Mi $3.30, ph $7.80. ATL-A-104

Mechanical properties of zirconium and zirconium-uranium alloys containing tin, by A. D. Schwope and others. Battelle Memorial Institute, Columbus, Ohio. Sep 52. Decl. November 20, 1959. Contract W-7405-eng-92. 18p. Order from LC. Mi $2.40, ph $3.30. BMI-770

Uranium migration in UO_2-bearing ceramics, J. F. Quirk and others. Battelle Memorial Institute, Columbus, Ohio. Sep 53. Decl. February 16, 1960. Contract W-7405-Eng-92. 30p. Order from LC. Mi $2.70, ph $4.80. BMI-862

Centrifugal casting of aluminum-uranium alloys, by N. E. Daniel and others. Battelle Memorial Institute, Columbus, Ohio. July 59. Decl. February 8, 1960. Contract W-7405-eng-92. 24p. Order from LC. Mi $2.70, ph $4.80. BMI-1363

Progress relating to civilian applications during July, 1960, by R. W. Dayton and C. R. Tipton Jr. Battelle Memorial Institute, Columbus, Ohio. Aug 60. Contract W-7405-eng-92. 79p. Order from OTS. $2.00. BMI-1455

Progress relating to civilian applications during August, 1960, by R. W. Dayton and C. R. Tipton, Jr. Battelle Memorial Institute, Columbus, Ohio. Sep 60. Contract W-7405-eng-92. 75p. Order from OTS. $2.00. BMI-1464

Progress on the use of gas-pressure bonding for fabricating low-cost ceramic, cermet, and dispersion fuels. Phase II report on AEC fuel-cycle program, by S. J. Paprocki and others. Battelle Memorial Institute, Columbus, Ohio. Nov 60. Contract W-7405-eng-92. 92p. Order from OTS. $2.00. BMI-1475

Analysis of the amount of preferred orientation by x-ray diffraction line intensities, by D. A. Vaughan. Battelle Memorial Institute, Columbus, Ohio. June 60. Contract W-7405-eng-92. 11p. Order from LC. Mi $2.40, ph $3.30. BMI-X-156

Beryllium, by M. J. Whitman. Oak Ridge National Laboratory, Oak Ridge, Tenn. Mar 57. Decl. August 14, 1959. Contract W-7405-eng-26. 25p. Order from LC. Mi $2.70, ph $4.80. CF-57-3-92

Survey of anodizing processes for aluminum, by H. L. Holsopple, Jr. Oak Ridge National Laboratory, Oak Ridge, Tenn. Aug 59. Contract W-7405-eng-26. 9p. Order from LC. Mi $1.80, ph $1.80. CF-59-8-132

Temperature structure in the midplane spacer for EGCR fuel rod, by L. G. Epel and J. K. T. Jung. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jan 60. 8p. Order from LC. Mi $1.80, ph $1.80. CF-60-1-2

5-GPM in-pile thorium oixide slurry loop development, runs 14 through 16 in loop L-4-24S, and filtration of thorium oxide slurry with sintered filters, by J. M. Baker and others. Oak Ridge National Laboratory, Oak Ridge, Tenn. Mar 60. 21p. Order from LC. Mi $2.40, ph $3.30. CF-60-3-39

Some remarks on the contribution of fission-product cesium to the pressure buildup in UO_2 fuel elements, by M. W. Rosenthal and S. Cantor. Oak Ridge National Laboratory, Oak Ridge, Tenn. Mar 60. 9p. Order from LC. Mi $1.80, ph $1.80. CF-60-3-81

Corrosion protection of stainless steel piping by titanium inserts: Examination of titanium inserts. removed from loop N after run N-24, by R. S. Greeley. Oak Ridge National Laboratory, Oak Ridge, Tenn. Mar 60. 6p. Order from LC. Mi $1.80, ph $1.80. CF-60-3-156

Some experiments on the accuracy of thoria slurry samples, by R. P. Wichner. Oak Ridge National Laboratory, Oak Ridge, Tenn. Apr 60. Contract W-7405-eng-26. 24p. Order from LC. Mi $2.70, ph $4.80. CF-60-4-93

Corrosion in the Oak Ridge Research reactor core-cooling system, by P. D. Neumann. Oak Ridge National Laboratory, Oak Ridge, Tenn. Apr 60. 17p. Order from LC. Mi $2.40, ph $3.30. CF-60-4-97

Cladding survey for the enrico fermi reactor U-15 Wt. % Mo base dispersion-type fuel element, by M. M. Martin and R. J. Beaver. Oak Ridge National Laboratory, Oak Ridge, Tenn. Apr 60. 39p. Order from LC. Mi $3.00, ph $6.30. CF-60-4-118

Examination of corrosion specimens from slurry blanket mockup runs SM-6 through SM-9, by R. B. Gallaher and others. Oak Ridge National Laboratory, Oak Ridge, Tenn. May 60. Contract W-7405-eng-26. 12p. Order from LC. Mi $2.40, ph $3.30. CF-60-5-137

Relative effectiveness of decontamination of various stainless steel surface finishes, by E. E. Pierce. Oak Ridge National Laboratory, Oak Ridge, Tenn. Contract W-7405-eng-26. 12p. Order from LC. Mi $2.40, ph $3.30. CF-60-6-54

Vacuum casting of aluminum-silicon coating on tuballoy [uranium]. Final report on a part of P. A. no. 390-ML-54-S, F. S. 17, by D. L. Schwartz and L. Kurland. University of Chicago, Metallurgical Laboratory, Chicago, Ill. Mar 45. Decl. January 29, 1960. Contract W-7405-eng-37. 27p. Order from LC. Mi $2.70, ph $4.80. CT-2751

Corrosion of construction materials, bonding materials, and uranium--an electrochemical investigation, by R. B. Hoxeng. University of Chicago, Metallurgical Laboratory, Chicago, Ill. May 45. Decl. January 28, 1960. Contract W-7405-eng-37. 70p. Order from LC. Mi $3.90, ph $10.80. CT-3023

Corrosion of unbonded aluminum-jacketed slugs in aqueous medium. Report on a phase of problem no. 391-ML-53-4; File serial no. 22, by G. C. English and others. University of Chicago, Metallurgical Laboratory, Chicago, Ill. Jan 45. Decl. January 30, 1945. Contract W-7405-eng-37. 15p. Order from LC. Mi $2.40, ph $3.30. CT-3047

Fabrication of uranium oxide fuel elements, by G. R. Cole and others. E. I. du Pont de Nemours & Co. Explosives Department, Atomic Energy Division, Technical Division, Savannah River, Laboratory, Aiken, S. C. Dec 59. Contract AT(07-2)-1. 36p. Order from OTS. $1.00. DP-430

Aqueous corrosion of aluminum at 260°C, by V. Whatley. E. I. du Pont de Nemours & Co. Explosives Department, Atomic Energy Division, Technical Division, Savannah River Laboratory, Aiken, S. C. Oct 60. Contract AT(07-2)-1. 12p. Order from OTS. 50 cents. DP-521

The noble gas permeability characteristics of graphite materials for use in gas-cooled reactors, by A. B. Riedinger and L. R. Zumwalt. General Atomic Division, General Dynamics Corp., San Diego, Calif. Apr 60. Contract AT(04-3)-314. 24p. Order from LC. Mi $2.70, ph $4.80. GA-1361

Effect of environment on the creep-rupture properties of Inconel 713C, by J. C. Brokros. General Dynamics Corporation, San Diego, Calif. Oct 60. Contract AT(04-3)-187. 17p. Order from OTS. 75 cents. GA-1629

Induction heated vacuum hot press, by E. W. Hoyt. Vallecitos Atomic Laboratory, Atomic Power Equipment Department, General Electric Company, Pleasanton, Calif. Mar 60. Contract AT(04-3)-189. 7p. Order from OTS. 50 cents. GEAP-3331

A survey of new cadmium materials for possible reactor application, by S. Siegel. Vallecitos Atomic Laboratory, Atomic Power Equipment Department, General Electric Company, Pleasanton, Calif. Apr 60. Contract AT(04-3)-189. 19p. Order from OTS. 50 cents. GEAP-3395

Fission gases, their measurement and evaluation, by T. J. Slosek and B. Weidenbaum. Vallecitos Atomic Laboratory, Atomic Power Equipment Department, General Electric Company, Pleasanton, Calif. Aug 60. Contract AT(04-3)-189. 15p. Order from OTS. 50 cents. GEAP-3440(Rev.)

Short time corrosion tests of bronze, mild steel, T-304 stainless steel and 2S aluminum in 10% potassium tetraborate solution, by Y. B. Katayama. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Dec 51. Decl. January 4, 1960. 4p. Order from LC. Mi $1.80, ph $1.80. HW-23022

Elimination of the cold outgassing period for the casting operation. Final report, by R. A. Carlson. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Jan 52. Decl. March 15, 1960. Contract W-31-109-Eng-52. 7p. Order from LC. Mi $1.80, ph $1.80. HW-23473

UNIVERSITY OF MICHIGAN LIBRARIES

The formation of chemical film deposits on aluminum surfaces, by R. V. Andrews. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Feb 52. 199p. Order from LC. Mi $8.70, ph $30.30.
HW-23494 (Del.)

Preliminary report on the ultrasonic properties of uranium, by D. C. Worlton and E. C. Wood. Hanford Works, Richland, Wash. Oct 52. Decl. December 3, 1959, Contract W-31-109-Eng-52. 31p. Order from LC. Mi $2.70, ph $4.80.
HW-26003

Briquetting of machined plutonium turnings for recycle to the casting operation. Final report--production test 235-6, by B. C. Chandler. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Nov 52. Decl. March 15, 1960. Contract W-31-109-Eng-52. 10p. Order from LC. Mi $1.80, ph $1.80.
HW-26141

Removal of graphite from aluminum surfaces, by R. L. Dillon and W. H. Hodgson. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. June 53. Decl. January 28, 1960. 4p. Order from LC. Mi $1.80, ph $1.80.
HW-28507

Some effects of striations on slug quality, by R. L. Knecht and J. W. Goffard. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Apr 54. Decl. January 29, 1960. Contract W-31-109-Eng-52. 8p. Order from LC. Mi $1.80, ph $1.80.
HW-31676

The gas contained in slug bond layer and blisters, by F. A. Scott and H. J. Anderson. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. June 54. Decl. January 29, 1960. Contract W-31-109-Eng-52. 4p. Order from LC. Mi $1.80, ph $1.80.
HW-32156

The removal of nickel from uranium, by R. L. D Dillon. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. June 54. Decl. January 28, 1960. Contract W-31-109-Eng-52. 5p. Order from LC. Mi $1.80, ph $1.80.
HW-32309

Hot press canning of thorium, by C. H. Bloomster. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Mar 55. Decl. March 16, 1960. Contract W-31-109-Eng-52. 8p. Order from LC. Mi $1.80, ph $1.80.
HW-36169

A study of the fabrication failures for zirconium and Zircaloy process tubes and of the annealing and cold rolling of Zircaloy-2, by D. E. Johnson. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. May 55. Decl. March 16, 1960. 28p. Order from LC. Mi $2.70, ph $4.80.
HW-36763

Flow stress recovery of Zircaloy-2, by D. E. Johnson. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Dec 55. Decl. January 8, 1960. 18p. Order from LC. Mi $2.40, ph $3.30.
HW-40312

Crystallite sizes of PuO_2 powders, by P. G. Pallmer. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. July 56. Decl. March 7, 1960. Contract W-31-109-Eng-52. 5p. Order from LC. Mi $1.80, ph $1.80.
HW-44585

Recording surface condition by replication, by J. R. Morgan. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Jan 57. Decl. March 28, 1960. Contract W-31-109-Eng-52. 21p. Order from LC. Mi $2.40, ph $3.30.
HW-48052

Design completion report; interlocking contour tooling system, by J. W. Nickolaus. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Oct 57. 9p. Order from LC. Mi $2.40, ph $3.30.
HW-53351

Post completion report--fuel engineering pilot plant semiworks--306 building, by S. M. Gill. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Nov 57. Contract AT(45-1)-1350. 8p. Order from LC. Mi $1.80, ph $1.80.
HW-53616

Ceramic coatings on uranium, by D. W. Shannon. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Jan 58. Decl. June 2, 1959. Contract W-31-109-Eng-52. 26p. Order from LC. Mi $2.70, ph $4.80.
HW-53666

Variable hydrogen dingot test, by R. E. Olson and O. W. Rathbun. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. June 58. Decl. March 31, 1960. Contract W-31-109-Eng-52. 17p. Order from LC. Mi $2.40, ph $3.30.
HW-56391

Results of NaK capsule failures in hot water flow tube, by J. W. Weber. General Electric Company, Hanford Atomic Products Operation,

Richland, Wash. Sep 58. Contract AT(45-1)-1350. 3p. Order from LC. Mi $1.80, ph $1.80. HW-56588

Plutonium fuels development, plutonium metallurgy operation quarterly report--January, February, March 1958, by O. J. Wick. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Sep 58. Contract W-31-109-Eng-52. 25p. Order from LC. Mi $2.70, ph $4.80. HW-57343

Alternate sieve plate materials for the "Zebra" cartridge, by W. R. Hamilton and J. H. Kleinpeter. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Dec 58. 6p. Order from LC. Mi $1.80, ph $1.80. HW-58311

Plutonium fuels development, plutonium metallurgy operation quarterly report--July, August, September 1958, by O. J. Wick. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Feb 59. Contract W-31-109-Eng-52. 26p. Order from LC. Mi $2.70, ph $4.80. HW-59365

Portland cement grout vapor pressure--temperature test, by H. W. Stivers. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. June 59. 12p. Order from LC. Mi $2.40, ph $3.30. HW-60556

Plutonium fuels development, plutonium metallurgy operation quarterly report--October, November, December 1958, by O. J. Wick. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Aug 59. Contract AT-(45-1)-1350. 28p. Order from LC. Mi $2.70, ph $4.80. HW-60996

Heat transfer testing, by D. R. Doman and others. General Electric Company. Hanford Atomic Products Operation, Richland, Wash. July 59. Contract AT(45-1)-1350. 7p. Order from LC. Mi $1.80, ph $1.80. HW-60998

Specifications for requisition G-385923--Zircaloy-4 fuel jacket tubing, by H. P. Oakes. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Nov 59. Contract AT(45-1)-1350. 6p. Order from LC. Mi $1.80, ph $1.80. HW-61329

Evaluation of fretting corrosion of ZR-2, by R. J. Lobsinger. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Feb 60. Contract AT(45-1)-1350. 10p. Order from LC. Mi $1.80, ph $1.80. HW-61915

Plutonium fuels development, plutonium metallurgy operation quarterly report for January, February, March 1959, by O. J. Wick. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. 1959. Contract AT(45-1)-1350 41p. Order from LC. Mi $3.30, ph $7.80. HW-61994

Preliminary investigation of the transformation rates of plutonium--uranium alloys, by R. D. Nelson and J. M. Taylor. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Jan 60. Contract AT(45-1)-1350. 19p. Order from LC. Mi $2.40, ph $3.30. HW-62073

Cracking of irradiated uranium by rapid cooling, by K. R. Merckx. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Oct 59. Decl. February 3, 1960. Contract AT(45-1)-1350. 11p. Order from LC. Mi $2.40, ph $3.30. HW-62447

Protection of carbon steel from atmospheric corrosion. Interim report no. 1, by L. D. Perrigo and R. G. Moles. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Oct 59. Contract AT(45-1)-1350. 8p. Order from LC. Mi $1.80, ph $1.80. HW-62466

Additional tests on the corrosion of carbon steel following the turco-4512 decontamination process, by A. P. Larrick. General Electric Company. Hanford Atomic Products Operation, Richland, Wash. Nov 59. Contract W-31-109-Eng-52. 9p. Order from LC. Mi $1.80, ph $1.80. HW-62690

The irradiated rupture prototype (IRP) design, by G. E. Neibaur and N. D. Stice. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Feb 60. Contract AT-(45-1)-1350. 12p. Order from LC. Mi $2.40, ph $3.30. HW-62701

Corrosion of type 202 stainless steel in high temperature water, by A. P. Larrick. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Dec 59. Contract AT(45-1)-1350. 8p. Order from LC. Mi $1.80, ph $1.80. HW-62820

Decontamination of the irradiated rupture prototype with peroxide--carbonate and apace, by G. E. Neibaur and R. D. Wack. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Jan 60. Contract AT(45-1)-1350. 9p. Order from LC. Mi $1.80, ph $1.80. HW-63346

UNIVERSITY OF MICHIGAN LIBRARIES

An initial study of the wear and galling of various fuel element support materials on autoclaved Zircaloy-2, by J. W. Weber. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Jan 60. Contract AT(45-1)-1350. 7p. Order from LC. Mi $1.80, ph $1.80. HW-63730

Development of a welding process for end closures on NPR and KER fuel element, by T. B. Correy and others. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Feb 60. Decl. with deletions July 8, 1960. 5p. Order from LC. Mi $1.80, ph $1.80. HW-63977(Del.)

A study of the wear and galling of various fuel element support materials on autoclaved Zircaloy-2. Interim report no. 2, by J. W. Weber. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Mar 60. Contract AT(45-1)-1350. 18p. Order from LC. Mi $2.40, ph $3.30. HW-64075

Burst testing of irradiated Zircaloy tubing, by V. E. Kahl. Hanford Atomic Products Operation, Richland, Wash. Mar 60. Contract AT(45-1)-1350. 11p. Order from OTS. 50 cents. HW-64168

Development of a welding process for spire-can fuel elements, by G. R. Hanson. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Mar 60. Contract AT(45-1)-1350. 9p. Order from LC. Mi $1.80, ph $1.80. HW-64294

Unique fabrication processes applied to fuel cladding materials, by S. H. Bush. General Electric Company, Hanford Atomic Products, Operation, Richland, Wash. Mar 60. Contract W-31-109-Eng-52. 23p. Order from LC. Mi $2.70, ph $4.80. HW-64335

Novel ceramic fuel fabrication processes, by The Staff of Ceramics Fuels Development, Hanford Atomic Products Operation, Hanford Laboratories Operation, Richland, Wash. Apr 60. Contract AT(45-1)-1350. 50p. Order from OTS. $1.25. HW-64629

Zircaloy process tube monitoring, by P. J. Pankaskie. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Apr 60. Contract AT(45-1)-1350. 8p. Order from LC. Mi $1.80, ph $1.80. HW-64731

Ultrasonic cleaning of fuel element components, by C. A. Strand. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Apr 60. Contract AT(4501)-1350. 5p. Order from LC. Mi $1.80, ph $1.80. HW-64796

Pb-Sn alloy replacements for UO_2 density standards, by J. A. Christensen. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Apr 60. 7p. Order from LC. Mi $1.80, ph $1.80. HW-64912

Ultrasonic grain size testing of Hanford fuel elements, by C. L. Frederick, Hanford Atomic Products Operation, Washingt n, D. C. May 60. Contract AT(45-1)-1350. 18p. Order from OTS. 50 cents. HW-64971

Autoclave testing of Zircaloy-2, by R. A. Thiede. Hanford Atomic Products Operation, Richland, Wash. June 60. Contract AT(45-1)-1350. 53p. Order from OTS. $1.50. HW-65350

A data recording system for the fuel core tester, by G. L. Waldkoetter. Hanford Atomic Products Operation, Richland, Wash. June 60. Contract AT(45-1)-1350. 19p. Order from OTS. 75 cents. HW-65756

Resonant frequency tester: A machine using measurement of frequency decay for quality evaluation of axial flow compressor blades, by E. R. Taylor and others. Union Carbide Nuclear Company, Division of Union Carbide Corporation, Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tenn. June 60. Contract W-7405-eng-26. 38p. Order from OTS. $1.00. K-1393

The diffusion of fission gases in metallic fuels, by M. B. Reynolds. Knolls Atomic Power Laboratory, Schenectady, N. Y. Apr 55. Decl. May 3, 1960. Contract W-31-109-Eng-52. 25p. Order from LC. Mi $2.70, ph $4.80. KAPL-1315

Grain refinement of cast beryllium, by A. E. Bibb and S. M. Bishop. Knolls Atomic Power Laboratory, Schenectady, N. Y. Apr 58. Changed from OFFICIAL USE ONLY June 17, 1960. Contract W-31-109-Eng-52. 19p. Order from LC. Mi $2.70, ph $4.80. KAPL-1917

Controlled atmosphere differential thermal analysis apparatus, by A. E. Bibb. Knolls Atomic Power Laboratory, Schenectady, N. Y. Jan 60. Contract W-31-109-Eng-52. 12p. Order from LC. Mi $2.40, ph $3.30. KAPL-M-AEB-6

Nondestructive testing of B_{10}SS poison wire, by A. J. Valachovic and R. C. Holt. Knolls Atomic Power Laboratory, Schenectady, N. Y. Mar 60. Contract W-31-109-Eng-52. 23p. Order from LC. Mi $2.70, ph $4.80. KAPL-M-AJV-1

Butt welding of copper to stainless steel sheet, by D. B. Kittle and J. M. Gerken. Knolls Atomic Power Laboratory, Schenectady, N. Y. Feb 60. Contract W-31-109-Eng-52. 10p. Order from LC. Mi $1.80, ph $1.80. KAPL-M-DBK-6

Brazing Inconel-sheated thermocouples to Inconel structural plugs and seal collars, by J. D. Carey and A. J. Palmer. Knolls Atomic Power Laboratory, N. Y. July 60. Contract W-31-109-Eng-52. 12p. Order from LC. Mi $2.40, ph $3.30. KAPL-M-JDC-1

Fabrication of box section type flow test assemblies by welding, by J. M. Gerken and S. A. Toftegaard. Knolls Atomic Power Laboratory, Schenectady, N. Y. Mar 60. 14p. Order from LC. Mi $2.40, ph $3.30. KAPL-M-JMG-13

Corrosion of aluminum in dilute aqueous solutions, by J. P. Howe. Knolls Atomic Power Laboratory, Schenectady, N. Y. [1948]. Decl. June 14, 1956. Contract W-31-109-Eng-52. 26p. Order from LC. Mi $2.70, ph $4.80. KAPL-M-JPH-20

Resume of Inconel design information, by G. C. Wheeler. Knolls Atomic Power Laboratory, Schenectady, N. Y. Feb 60. Contract W-31-109-Eng-52. 11p. Order from LC. Mi $2.40, ph $3.30. KAPL-M-NMA-1

Process description for covering metal with a laminated ceramic coating, by R. E. Mistler and others. Knolls Atomic Power Laboratory, Schenectady, N. Y. Dec 59. Contract W-31-109-Eng-52. 10p. Order from LC. Mi $1.80, ph $1.80. KAPL-M-REM-1

Fatigue tests of S3G fuel cell tube structure sections, by S. Beitscher and G. L. Cutler. Knolls Atomic Power Laboratory, Schenectady, N. Y. Dec 59. Contract W-39-109-Eng-52. 22p. Order from LC. Mi $2.70, ph $4.80. KAPL-M-SAB-1(Rev.)

The ARC welding of end caps to rectangular coextruded irradiation specimens, by W. A. Owczarski and J. F. Bollinger. Knolls Atomic Power Laboratory, Schenectady, N. Y. Jan 60. Contract W-31-109-Eng-52. 23p. Order from LC Mi $2.70, ph $4.80. KAPL-M-WAO-5

The hot ductility of Inconel BP-85 weld desposits, by W. A. Owczarski. Knolls Atomic Power Laboratory, Schenectady, N. Y. Apr 60. Contract W-31-109-Eng-52. 22p. Order from LC. Mi $2.70, ph $4.80. KAPL-M-WAO-7

The feasibility of bubble testing rhombus and cluster assemblies, by W. H. Pappin. Knolls Atomic Power Laboratory, Schenectady, N. Y. July 60. Contract W-31-109-Eng-52. 11p. Order from L. Mi $2.40, ph $3.30. KAPL-M-WHP-1

Development of techniques for rolling uranium metal, by D. E. Deutsch and others. Los Alamos Scientific Laboratory, Los Alamos, N. Mex. Nov 50. Decl. with deletions January 28, 1960. Contract W-7405-eng-36. 128p. Order from LC. Mi $6.30, ph $19.80. LA-1180(Del.)

Welding of plutonium, by J. W. Anderson and others. Los Alamos Scientific Laboratory, Los Alamos, N. Mex. May 58. Decl. March 13, 1959. Contract W-7405-eng-36. 13p. Order from LC. Mi $2.40, ph $3.30. LA-2220

The use of quartz tubes for sampling and casting plutonium, by K. W. R. Johnson and J. W. Anderson. Los Alamos Scientific Laboratory, Los Alamos, N. Mex. Aug 58. Decl. March 16, 1960. Contract W-7405-eng-36. 16p. Order from LC. Mi $2.40, ph $3.30. LA-2250

The adaptation of new research techniques to mineral engineering problems, by K. Brauer and others. Massachusetts Institute of Technology, Department of Metallurgy, Cambridge, Mass. Apr 60. Contract AT(30-1)-956. 48p. Order from OTS. $1.25. MITS-44

Literature survey on uranium monocarbide, by J. L. Kane. Martin Company, Nuclear Division, Baltimore, Md. July 59. 20p. Order from LC. Mi $2.40, ph $3.30. MND-2081

Coated particle investigation. Final summary report. Volume 1, by D. Goslee. Martin Company, Nuclear Division, Baltimore, Md. Apr 59. Con-AT(11-1)-589. 63p. Order from LC. Mi $3.90, ph $10.80. MND-AC-1755-1

Atomistic interpretation of radiation effects in metals, by A. Sosin. Atomics International Division, North American Aviation, Inc., Canoga Park, Calif. Dec 59. Contract AT-11-1-GEN-8. 34p. Order from LC. Mi $3.00 ph $6.30. NAA-SR-4301

UNIVERSITY OF MICHIGAN LIBRARIES

Finely dispersed phases in uranium-molybdenum ternary alloys, by D. Kramer. Atomics International, A Division of North American Aviation, Inc., Canoga Park, Calif. November 60. Contract AT(11-1)-GEN-8. 18p. Order from OTS. 50 cents. NAA-SR-5507

Preparation of thorium-aluminum alloys by direct thoria reduction, by D. O. Raleigh. Atomics International, A Division of North American Aviation, Inc., Canoga Park, Calif. Dec 60. Contract AT(11-1)-GEN-8. 29p. Order from OTS. 50 cents. NAA-SR-5689

The vapor pressure of BeO, by T. A. Milne. Atomics International, A Division of North American Aviation, Inc., Canoga Park, Calif. Dec 56. 20p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-1795

Review of literature on thermal expansion of cermet components and metal-ceramic interface reactions, by D. J. Klein. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Jan 57. 14p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-1837

Effect of exposing uranium to santowax R at 350°F, by H. E. Kline. Atomics International, Division of North American Aviation, Inc., Canoga Park, Calif. May 57. 9p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-1942

Rates of alloying of SRE metal fuels with their jackets above 1600°F, by R. S. Neymark. Atomics International Division, North American Aviation, Inc., Canoga Park, Calif. June 58. 12p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-2835

Preliminary investigation of uranium compounds for use as fuels in sodium graphite reactors, by W. Robson and B. Webb. Atomics International Division, North American Aviation, Inc., Canoga Park, Calif. Aug 58. 9p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-2995

Mechanical assembly fabrication of oxide fuel elements, by E. F. Cook. Atomics International Division, North American Aviation, Inc., Canoga Park, Calif. Dec 58. 22p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-3299

Strength tests on low-melting-point alloy seal, by R. S. Kennedy. Atomic International. Division of North American Aviation, Inc., Canoga Park, Calif. Apr 59. 11p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-3641

HNPF-pressure build-up and gas space requirements of the U-10 w/o Mo fuel elements, by H. L. Sletten and A. Musso, Jr. Atomics International Division, North American Aviation, Inc., Canoga Park, Calif. May 59. 18p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-3889

Investigation of vapor phase plating for cladding reactor fuels: Literature search, by J. Bodine. Atomics International Division, North American Aviation, Inc., Canoga Park, Calif. July 59. 14p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-4140

Production and fabrication of UC by ARC melting, by D. H. Turner. Atomics International Division, North American Aviation, Inc., Canoga Park, Calif. Sep 59. 14p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-4378

Compatibility of U-10 Mo with 304 stainless steel at 1000°F, by R. S. Neymark. Atomics International Division, North American Aviation, Inc., Canoga Park, Calif. Feb 60. 7p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-4943

The diffusion of hydrogen through zirconium, by K. A. Sense. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Mar 60. 7p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-5067

Resistivity of U-Mo alloy fuel measurements and standards test no. 2352, by G. A. Stone. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Apr 60. 5p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-5150

Materials for radiator-condenser shell, by J. C. sells. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Apr 60. 18p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-5183

Elevated temperature wear characteristics of Zircaloy-2 and type 304 stainless steel in contact with Hastelloy-X, by J. A. Roberson. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Feb 60. 13p. Order from LC. $2.40, ph $3.30. NAA-SR-Memo-5252

Compatibility of UO_2 and APM-M-257, revision of TDR-4270, by K. Langrod. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. May 60. 7p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-5330 (Rev. A)

AEC safety monograph. Chapter 11. Metal-water reactions, by W. L. Brooks and H. Soodak. Nuclear Development Corporation of America, White Plains, N. Y. [1956]. Decl. December 29, 1959. 21p. Order from LC. Mi $2.70, ph $4.80. NDA-15K-3

Determination of the solution rate of metals in lithium, by B. Minushkin. Nuclear Development Corporation of America, White Plains, N. Y. June 58. Decl. with deletions November 10, 1958. 40p. Order from LC. Mi $3.30, ph $7.80. NDA-44(Del.)

The preparation and properties of dispersion hardened uranium powder products. Quarterly technical report for the period ending June 30, 1959, by W. Arbiter. Nuclear Development Corporation of America, White Plains, N. Y. July 59. Contract AT(30-1)-2303. 18p. Order from LC. Mi $3.00, ph $6.30. NDA-2112-2

The preparation and properties of dispersion hardened uranium powder products. Quarterly technical report for the period ending September 30, 1959, by W. Arbiter. Nuclear Development Corporation of America, White Plains, N. Y. Oct 59. Contract AT(30-1)-2303. 31p. Order from LC. Mi $3.00, ph $6.30. NDA-2112-4

Sponge fuel evaluation. Quarterly technical report for the period ending December 31, 1959, by J. M. KcKee. Nuclear Development Corporation of America, White Plains, N. Y. Feb 60. Contract AT(30-1)-2303. 9p. Order from LC. Mi $1.80, ph $1.80. NDA-2116-5

Carbide fuel development. Progress report for period of September 15, 1959 to January 31, 1960, by A. Strasser and K. Taylor. Carboundum Company, Niagara Falls, N. Y. Mar 60. Contract AT(30-1)-2303. 22p. Order from LC. Mi $2.70, ph $4.80. NDA-2145-1

Carbide fuel development. Progress report for February 1, 1960 to April 30, 1960, by A. Strasser and K. Taylor. Nuclear Development Corporation of America, White Plains, N. Y. and Carborundum Company, Niagara Falls, N. Y. June 60. Contract AT(30-1)-2303. 13p. Order from LC. Mi $2.40, ph $3.30. NDA-2145-4

Prediction of dimensional changes in uranium fuel elements during irradiation--The elastic solution interim report, by P. R. Morris and R. N. Thudium. National Lead Company of Ohio, Cincinnati, Ohio. Sep 60. Contract AT(30-1)-1156. 27p. Order from OTS. 75 cents. NLCO-816

The application of the chip and shot methods to the preparation of homogeneous alloys, by D. S. Kneppel. Nuclear Metals, Inc., Concord, Mass. Sep 58. Decl. March 31, 1960. Contract AT (30-1)-1565. 40p. Order from LC. Mi $3.00, ph $6.30. NMI-1206

Texture of extruded zirconium and Zircaloy-2 tubing, by V. Nerses. Nuclear Metals, Inc., Concord, Mass. July 60. Contract AT(30-1)-1565. 35p. Order from OTS. 75 cents. NMI-1222

Preliminary attempts to produce randomly oriented wrought beryllium and their relation to texture development, by F. M. Yans and P. Pointu. Nuclear Metals, Inc., Concord, Mass. July 60. Contract AT(30-1)-1565. 53p. Order from OTS. $1.25. NMI-1225

Analysis of oxygen in beryllium, by A. R. Gilman and S. Isserow. Nuclear Metals, Inc., Concord, Mass. May 60. Contract AT(30-1)-1565. 24p. Order from LC. Mi $2.70, ph $4.80. NMI-1234

Fabrication development of beryllium-clad uranium-3.8% silicon, uranium-10% molybdenum, and uranium - uranium monocarbide cermets, by J. Greenspan. Nuclear Metals, Inc., Concord, Mass. Aug 60. Contract AT(30-1)-1565. 71p. Order from OTS. $1.75. NMI-1236

Retention of uranium beta phase, by A. L. Geary and V. Nerses. Nuclear Metals, Inc., Concord, Mass. Aug 60. Contract AT(30-1)-1565. 32p. Order from LC. Mi $3.00, ph $6.30. NMI-1237

A metallographic study of the swelling of uranium and uranium alloys, by A. Boltax and A. R. Lumbert. Nuclear Metals, Inc., Concord, Mass. Aug 60. Contract AT(30-1)-1565. 78p. Order from OTS. $1.75. NMI-1239

Preliminary survey of mechanical properties and phase relationships in several beryllium binary alloys for July 1, 1958-June 30, 1959, by F. M. Yans. Nuclear Metals, Inc., Concord, Mass. Sep 60. Contract AT(30-1)-1565. 41p. Order from OTS. $1.00. NMI-1240

Deformation modes of single crystal uranium dioxide from 700°C to 1900°C, by E. J. Rapperport and A. M. Huntress. Nuclear Metals, Inc., Concord, Mass. Aug 60. Contract AT(30-1)-1565. 29p. Order from OTS. 75 cents. NMI-1242

UNIVERSITY OF MICHIGAN LIBRARIES

Fabrication of clad massive UO_2 fuel elements by hot extrusion. Monthly letter report for September. Nuclear Metals, Inc., Concord, Mass. Oct 59. 6p. Order from LC. Mi $1.80, ph $1.80. NMI-2504

The fabrication of clad massive UO_2 fuel elements by coextrusion. Quarterly progress report no. 4. for February, March, and April 1960, by J. G. Hunt and P. Loewenstein. Nuclear Metals, Inc., Concord, Mass. June 60. Contract AT (30-1)-1565. 24p. Order from LC. Mi $2.40, ph $3.30. NMI-2510

Fundamental and applied research and development in metallurgy. Progress report for November 1958. Nuclear Metals, Inc., Concord, Mass. Jan 59. Decl. May 18, 1960. 20p. Order from LC. Mi $2.40, ph $3.30. NMI-2072

Fundamental and applied research and development in metallurgy. Progress report for December 1958. Nuclear Metals, Inc., Concord, Mass. Feb 59. Decl. May 18, 1960. 20p. Order from LC. Mi $2.40, ph $3.30. NMI-2073

Fundamental and applied research and development in metallurgy. Progress report for January 1959. Nuclear Metals, Inc., Concord, Mass. Mar 59. Decl. May 18, 1960. 30p. Order from LC. Mi $2.70, ph $4.80. NMI-2074

Fundamental and applied research and development in metallurgy. Progress report for March 1959. Nuclear Metals, Inc., Concord, Mass. May 59. Decl. May 18, 1960. 52p. Order from LC. Mi $3.30, ph $7.80. NMI-2076

Fundamental and applied research and development in metallurgy. Progress report for November 1959. Nuclear Metals, Inc., Concord, Mass. May 60. Contract AT(30-1)-1565. 31p. Order from LC. Mi $2.70, ph $4.80. NMI-2081

Fundamental and applied research and development in metallurgy. Progress report for December 1959. Nuclear Metals, Inc., Concord, Mass. May 60. Contract AT(30-1)-1565. 28p. Order from LC. Mi $2.70, ph $4.80. NMI-2082

Fundamental and applied research and development in metallurgy. Progress report for January 1960. Nuclear Metals, Inc., Concord, Mass. May 60. Contract AT(30-1)-1565. 25p. Order from LC. Mi $2.70, ph $4.80. NMI-2083

Fundamental and applied research and development in metallurgy. Progress report for February 1960. Nuclear Metals, Inc., Concord, Mass. May 60. Contract AT(30-1)-1565. 36p. Order from LC. Mi $3.00, ph $6.30. NMI-2084

Fundamental and applied research and development in metallurgy. Progress report for March 1960. Nuclear Metals, Inc., Concord, Mass. June 60. Contract AT(30-1)-1565. 39p. Order from LC. Mi $3.00, ph $6.30. NMI-2085

Fundamental and applied research and development in metallurgy. Progress report for April 1960. Nuclear Metals, Inc., Concord, Mass. June 60. Contract AT(30-1)-1565. 33p. Order from LC. Mi $3.00, ph $6.30. NMI-2086

Evaluation of Zircaloy-clad U-2 w/o Zr alloy tube no. 23. Extrusion no. 18394, by D. F. Kaufman and R. G. Jenkins. Nuclear Metals, Inc., Concord, Mass. Feb 59. Contract AT(30-1)-1565. 36p. Order from LC. Mi $3.00, ph $6.30. NMI-4375

Evaluation of six Zircaloy-clad U-2 w/o Zr alloy tubes made for irradiation in the VBWR test loop, by D. F. Kaufman and W. J. Richmond. Nuclear Metals, Inc., Concord, Mass. June 59. Contract AT(30-1)-1565. 66p. Order from LC. Mi $3.90, ph $10.80. NMI-4387 (Del.)

Coextrusion of Zircaloy-clad U-2 ^{w}/o Zr rod for the EBR-I Mark III core loading, by H. F. Sawyer. Nuclear Metals, Inc., Cambridge, Mass. Apr 58. Contract AT(30-1)-1565. 53p. Order from OTS. $1.25. NMI-4801

Development work on the fabrication of CP-5 fuel element tubes, by J. Wong. Nuclear Metals, Inc., Concord, Mass. May 60. Contract AT (30-1)-1565. 52p. Order from OTS. $1.25. NMI-4852

Feasibility report for the fabrication of prototype Zircaloy-clad uranium fuel rod for Hanford Atomic Products Operation, by H. F. Sawyer. Nuclear Metals, Inc., Cambridge, Mass. Jan 58. 35p. Order from LC. Mi $3.00, ph $6.30. NMI-FR-15

The development of uranium carbide as a nuclear fuel. First annual report May 1, 1959 to April 30, 1960, by H. S. Kalish and others. Metallurgical Laboratories, Olin Mathieson Chemical Corporation, New Haven, Conn. June 60. Contract AT(30-1)-2374. 38p. Order from OTS. $1.00. NY)-2688

Nuclear fuel research fuel cycle development program. Quarterly progress report for April 1, to June 30, 1960, by R. B. Holden and others. Metallurgical Laboratories, Olin Mathieson Chemical Corporation, New Haven, Conn. July 60. Contrcct AT(30-1)-2374. 22p. Order from OTS. 75 cents. NYO-2689

The development and testing of homogeneous ceramic fuels. Progress report for period September 1-November 30, 1959, by G. Zuromsky. Combustion Engineering, Inc., Nuclear Division, Windsor, Conn. 1959. Contract AT(30-1)-2379. 24p. Order from LC. Mi $2.70, ph $4.80. NYO-2742

A program to study the feasibility of and develop an apparatus for the ultrasonic roll bonding of fuel plates. Monthly progress letter. Task IV, by R. K. Steele. Combustion Engineering, Inc., Nuclear Division, Windsor, Conn. Dec 59. Contract AT(30-1)-2379. With this is bound: Progress report no. 4 covering the period October 16 to November 15, 1959, by H. L. McKaig Jr. Aeroprojects Inc., West Chester, Pa. Dec 59. 15p. Order from LC. Mi $2.40, ph $3.30. NYO-2794

Final report on coating fuel elements, November 14, 1959. Nuclear Materials and Equipment Corporation, Apollo, Pa. 1959. Changed from OFFICIAL USE ONLY July 5, 1960. Contract AT(30-1)-2264. 61p. Order from LC. Mi $3.90, ph $10.80. NYO-2801

Quarterly progress report for November 16, 1959 to February 15, 1960. Nuclear Materials and Equipment Corporation, Apollo, Pa. 1960. Changed from OFFICIAL USE ONLY July 5, 1960. Contract AT(30-1)-2264. 26p. Order from LC. Mi $3.00, ph $6.30. NYO-2804

X-ray measurement of twin faulting in FCC metals, by B. E. Warren. Massachusetts Institute of Technology, Cambridge, Mass. 1959. Contract AT(30-1)-858. 9p. Order from LC. Mi $1.80, ph $1.80. NYO-4834

Ultrasonically accelerated dissolution of high-temperature and corrosion-resistant metals, by J. L. Straughn and W. B. Tarpley. Aeroprojects Inc., West Chester, Pa. May 58. Decl. March 16, 1960. Contract AT(30-1)-1836. 16p. Order from LC. Mi $2.40, ph $3.30. NYO-7925

Solid-liquid equilibrium in the systems lithium hydride-titanium hydride and lithium hydride-zirconium hydride, by C. E. Messer and Ira S. Levy. Tufts University, Medford, Mass. July 60. Contract AT(30-1)-1410. 9p. Order from LC. Mi $1.80, ph $1.80. NYO-8029

An X-ray diffraction study of the palladium-hydrogen system at elevated temperatures and under hydrogen pressure, by A. J. Maeland and T. R. P. Gibbs, Jr. Tufts University, Medford, Mass. Jan 60. Contract AT(30-1)-1355. 17p. Order from LC. Mi $2.40, ph $3.30. NYO-7551

The stabilization of aqueous suspensions of thorium oxide. Progress report for November 1, 1958-February 29, 1960, by V. K. La Mer and others. Columbia University, New York, N. Y. Apr 60. Contract AT(30-1)-2267. 29p. Order from LC. Mi $2.70, ph $4.80. NYO-8797

An approach to the study of solid state bonding. Final report for December 1958-Nobember 1959, by R. K. Steele and J. Kozol. Combustion Engineering, Inc., Nuclear Division, Windson, Conn. 1959. Changed from OFFICIAL USE ONLY March 16, 1960. Contract AT(30-1)-2302. 44p. Order from LC. Mi $3.30, ph $7.80. NYO-8906

Quarterly progress report no. 2 covering period February 16, 1960 to May 15, 1960. Nuclear Materials and Equipment Corporation, Apollo, Pa. 1960. Contract AT(30-1)-2264. 30p. Order from LC. Mi $3.00, ph $6.30. NYO-9184

Metallurgy division quarterly progress report for period ending October 31, 1950, by E. C. Miller and W. H. Bridges. Oak Ridge National Laboratory, Oak Ridge, Tenn. Feb 51, Decl. with deletions October 19, 1959. Contract W-7405-eng-26. 70p. Order from LC. Mi $3.90, ph $10.80. ORNL-910 (Del.)

Metallurgy division quarterly progress report for period ending January 31, 1951, by E. C. Miller and W. H. Bridges. Oak Ridge National Laboratory, Oak Ridge, Tenn. June 51. Decl. with deletions October 27, 1959. Contract W-7405-eng-26. 73p. Order from LC. Mi $4.50, ph $12.30. ORNL-987 (Del.)

Metallurgy division quarterly progress report for period ending October 31, 1951, by W. H. Bridge Bridges. Oak Ridge National Laboratory, Oak Ridge, Tenn. Apr 52. Decl. with deletions Nobember 12, 1959. Contract W-7405-eng-26. 56p. Order from LC. Mi $3.60, ph $9.30. ORNL-1161 (Del.)

Solid state division semiannual progress report for period ending August 31, 1955. Oak Ridge National Laboratory, Oak Ridge, Tenn. Nov 55. Decl. October 22, 1959. Contract W-7405-eng-26. 36p. Order from LC. Mi $3.00, ph $6.30. ORNL-1944

UNIVERSITY OF MICHIGAN LIBRARIES

Metallurgy division semiannual progress report for period ending October 10, 1956. Oak Ridge National Laboratory, Oak Ridge, Tenn. 1956. Decl. with deletions November 4, 1959. Contract W-7405-eng-26. 231p. Order from LC. Mi $10.20, ph $36.30. ORNL-2217 (Del.)

Electroless-plated brazing alloys, by P. Patriarca and others. Oak Ridge National Laboratory, Oak Ridge, Tenn. Mar 57. Contract W-7405-eng-26. 13p. Order from LC. Mi $2.40, ph $3.30. ORNL-2243

The solubility of nitrogen and oxygen in lithium and methods of lithium purification, by E. E. Hoffman. Oak Ridge National Laboratory, Oak Ridge, Tenn. Mar 60. Contract W-7405-eng-26. 23p. Order from LC. Mi $2.70, ph $4.80. ORNL-2894

A failure analysis for the low-temperature performance of dispersion fuel elements, by J. R. Weir. Oak Ridge National Laboratory, Oak Ridge, Tenn. June 60. Contract W-7405-eng-26. 36p. Order from LC. Mi $3.00, ph $6.30. ORNL-2902

Columbium clad uranium carbide fuel element. Quarterly report no. 2 for August 1-October 31, 1959, by J. J. Finley and others. Union Carbide Metals Company, Niagara Falls, N. Y. Nov 59. Contract AT(40-1)-2559. 17p. Order from LC. Mi $2.40, ph $3.30. ORO-222

Fuel-bearing fiberglas in aluminum base fuel elements. Quarterly report no. 2 for August 1, 1959 to October 31, 1959, by R. H. Baskey. Clevite Corporation, Mechanical Research Division, Cleveland, Ohio. Nov 59. Contract AT (40-1)-2557. 37p. Order from LC. Mi $3.00, ph $6.30. ORO-224

Monthly progress letter no. 6 for period November 1, 1959 to November 30, 1959, by R. H. Baskey. Clevite Corporation, Mechanical Research Division, Cleveland, Ohio. Dec 59. Contract AT (40-1)-2557. 4p. Order from LC. Mi $1.80, ph $1.80. ORO-226

Monthly letter report no. 11 covering period September 15 to October 15, 1959, by J. D. Fleming. Georgia Institute of Technology, Engineering Experiment Station, Atlanta, Ga. Oct 59. Contract AT(40-1)-2483. 2p. Order from LC. Mi $1.80, ph $1.80. ORO-236

Columbium clad uranium carbide fuel element contract. Monthly letter report for November 1 through November 30, 1959, by J. J. Finley and and others. Union Carbide Metals Company, Niagara Falls, N. Y. 1959. Contract AT(40-1)-2559. 2p. Order from LC. Mi $1.80, ph $1.80. ORO-241

Monthly progress report no. 7 for period December 1, 1959 to December 31, 1959, by R. H. Baskey. Clevite Research Center, Cleveland, Ohio. Jan 60. Contract AT(40-1)-2557. 3p. Order from LC. Mi $1.80, ph $1.80. ORO-246

Monthly progress report no. 8 for period January 1, 1960 to January 31, 1960, by R. H. Baskey. Clevite Research Center, Cleveland, Ohio. Feb 60. Contract AT(40-1)-2557. 4p. Order from LC. Mi $1.80, ph $1.80. ORO-247

Synthesis and fabrication of refractory uranium compounds. Quarterly report no. 2 covering period September 1 to November 30, 1959, by K. M. Taylor and others. Carborundum Company, Niagara Falls, N. Y. Dec 59. Contract AF(40-1)-2558. 21p. Order from LC. Mi $2.70, ph $4.80. ORO-248

Monthly letter report no. 13 covering the period from November 15 to December 15, 1959, by J. D. Fleming. Georgia Institute of Technology, Engineering Experiment Station, Atlanta, Ga. Dec 59. Contract AT940-1)-2483. 2p. Order from LC. Mi $1.80, ph $1.80. ORO-250

Monthly letter report no. 14 covering period December 15, 1959 to January 15, 1960, by J. D. Fleming. Georgia Institite of Technology, Engineering Experiment Station, Atlanta, Ga. Jan 60. Contract AT(40-1)-2483. 3p. Order from LC. Mi $1.80, ph $1.80. ORO-251

Synthesis and fabrication of refractory uranium compounds. Monthly progress report no. 5 for December 1 to December 31, 1959, by K. M. Taylor and others. Carborundum Company, Niagara Falls, N. Y. Jan 60. Contract AT (40-1)-2558. 6p. Order from LC. Mi $1.80, ph $1.80. ORO-254

Monthly letter report no. 15 covering the period from January 15 to February 15, 1960, by J. D. Fleming. Georgia Institute of Technology, Engineering Experiment Station, Atlanta, Ga. Feb 60. Contract AT(40-1)-2483. 2p. Order from LC. Mi $1.80, ph $1.80. ORO-255

Columbium clad uranium carbide fuel element contract. Monthly letter report for December 1 through December 31, 1959, by J. J. Finley and others. Union Carbide Metals Company, Niagara Falls, N. Y. 1959. Contract AT(40-1)-2559.

3p. Order from LC. Mi $1.80, ph $1.80.
ORO-256

Columbium clad uranium carbide fuel element. Quarterly report no. 3 for November 1, 1959-January 31, 1960, by J. J. Finley and others. Union Carbide Metals Company, Niagara Falls, N. Y. Feb 60. Contract AT(40-1)-2559. 30p. Order from LC. MI $2.70, ph $4.80.
ORO-262

Synthesis and fabrication of refractory uranium compounds. Quarterly report no. 3 for December 1, 1959 to February 29, 1960, by K. M. Taylor and others. Carborundum Company, Research and Development Division, Niagara Falls, N.Y. Mar 60. Contract AT(40-1)-2558. 19p. Order from LC. Mi $2.40, ph $3.30.
ORO-264

Synthesis and fabrication of refractory uranium compounds. Monthly progress report no. 7 for March 1 through March 31, 1960, by K. M. Taylor and others. Carborundum Company, Niagara Falls, N. Y. Apr 60. Contract AT (40-1)-2558. 4p. Order from LC. Mi $1.80, ph $1.80.
ORO-267

Fuel hearing fiberglas in aluminum base fuel elements. Monthly progress letter no. 9 for period February 1, 1960 to February 29, 1960, by R. H. Baskey. Clevite Corporation Mechanical Research Division, Cleveland, Ohio. Mar 60. Contract AT(40-1)-2557. 4p. Order from LC. Mi $1.80, ph $1.80.
ORO-278

Fuel-bearing fiberglas in aluminum base fuel elements. Quarterly report no. 4 for February 1, 1960 to April 30, 1960, by R. H. Baskey. Clevite Corporation, Mechanical Research Division, Cleveland, Ohio. June 60. Contract AT(40-1)-2557. 26p. Order from LC. Mi $2.70, ph $4.80.
ORO-300

Brittle fracture; ductile-brittle transitions, an annotated bibliography, by E. A. Cernak and E. J. Delgrosso. Pratt & Whitney Aircraft, Division of United Aircraft Corporation, Canel, Middletown, Conn. Oct 60. Contract AT(11-1)-229. 91p. Order from OTS. $2.25.
PWAC-301

Investigation of salts for use in uranium metal heat-treating baths, by S. R. Pocsik. The Dow Chemical Company, Rocky Flats Plant, Denver, Colo. July 60. Contract AT(29-1)-1106. 22p. Order from OTS. 50 cents.
RFP-191

Dimensionally stable alloys. Interim report, by A. L. Eiss and H. S. Kalish. Sylvania-Corning Nuclear Corporation, Bayside, N. Y. Oct 57. Decl. March 30, 1960. Contract AT-30-1-GEN-366. 47p. Order from LC. Mi $3.30, ph $7.80.
SCNC-249

Technical progress report for period July 1 to August 31, 1957. Sylvania-Corning Nuclear Corporation, Bayside, N. Y. Dec 57. Decl. January 8, 1960. Contract AT-30-1-GEN-366. 20p. Order from LC. Mi $2.40, ph $3.30.
SCNC-254

Quarterly technical progress report for period ending December 31, 1957. Sylvania-Corning Nuclear Corporation, Bayside, N. Y. Mar 58. Decl. January 8, 1960. Contract AT-30-[1]-GEN-366. 61p. Order from LC. Mi $3.60 ph $9.30.
SCNC-261

Studies of strain wave propagation and associated current output in barium titanate, by J. W. Daily. Sandia Corporation, Albuquerque, N. Mex. Nov 59. 46p. Order from LC. Mi $3.30, ph $7.80.
SCTM-294-59(51)

The electrical behavior of exploding wires. A survey of various materials, by T. J. Tucker and F. W. Neilson. Sandia Corporation, Albuquerque, N. Mex. Nov 59. Revised December 11, 1959. 122p. Order from LC. Mi $5.70, ph $16.80.
SCTM-334-59(51)

The thermal EMF of copper-constantan thermocouples as a function of junction fabrication, by J. L. Hartley. Sandia Corporation, Albuquerque, N. Mex. Dec 59. 18p. Order from LC. Mi $2.40, ph $3.30.
SCTM-373-59(16)

The staking method of deforming metals and joining parts, by R. P. Lewis. Sandia Corporation, Albuquerque, N. Mex. Feb 60. 24p. Order from LC. Mi $2.70, ph $4.80.
SCTM-376-59(25)

A determination of design strengths for 6061-T-6 aluminum weldments, by D. W. Grobecker. Sandia Corporation, Albuquerque, N. Mex. Jan 59. Contract AT(29-1)-789. 37p. Order from LC. Mi $3.00, ph $6.30.
SCTM-426-58(16)

Physical properties of uranium slugs made by powder metallurgy, by J. L. Zambrow and H. H. Hausner. Sylvania Electric Products Inc., Bayside, N. Y. July 52. Decl. February 16, 1960. Contract AT-30-1-GEN-366. 20p. Order from LC. Mi $2.40, ph $3.30.
SEP-95

Uranium-aluminum diffusion and associated studies, by S. Storchheim and J. Zambrow. Sylvania Electric Products Inc., Atomic Energy Division, Bayside, N. Y. Oct 52. Decl. February 16, 1960. Contract AT-30-1-GEN-366. 29p. Order from LC. Mi $2.70, ph $4.80. SEP-102

Uranium metal quality testing program. Progress report no. 1, by N. Grossman. Sylvania Electric Products, Inc., Bayside, N. Y. Oct 53. Decl. July 14, 1960. Contract AT-30-1-GEN-366. 84p. Order from OTS. 60 cents. SEP-135(Rev.)

The fabrication of hollow cylindrical fuel elements from uranium powder, by J. Fugardi and others. Technical Information Service, Oak Ridge National Laboratory, Oak Ridge, Tenn. [nd]. Decl. April 20, 1960. 27p. Order from OTS. 30 cents. SEP-157

Perforated water fuel elements, by H. S. Kalish and others. Sylvania Electric Products, Inc., Atomic Energy Division, Bayside, N. Y. Sep 55. Decl. December 15, 1959. Contract AT(11-1)-229. 25p. Order from LC. Mi $2.70, ph $4.80. SEP-159

Hydrostatic pressing of metal powders, by C. A. Meyers and W. G. Lidman. Sylvania Electric Products, Inc., Atomic Energy Division, Bayside, N. Y. Sep 54. Decl. February 16, 1960. Contract AT-30-1-EGN-366. 21p. Order from LC. Mi $2.40, ph $3.30. SEP-180

Canning nickel-plated uranium slugs in aluminum, by J. Storchheim and others. Sylvania Electric Products Inc., Atomic Energy Division, Bayside, N. Y. Jan 55. Decl. May 4, 1960. 31p. Order from LC. Mi $3.00, ph $6.30. SEP-181

Monthly technical progress report for August 1956. Sylvania Electric Products, Inc., Atomic Energy Division, Bayside, N. Y. Oct 56. Decl. February 4, 1960. Contract AT-30-1-GEN-366. 21p. Order from LC. Mi $2.70, ph $4.80. SEP-234

The self-diffusion of niobium—III. Final progress report for July 1, 1958 to January 1, 1959, by R. Resnick and others. Sylvania Electric Products Inc., Research Laboratories, Bayside, N. Y. Mar 59. Contract AT(30-1)-2102. 14p. Order from LC. Mi $2.40, ph $3.30. SEP-252

Effect of hot press cladding on mechanical properties and microstructure of uranium plate, by W. R. McDonell. DuPont de Nemours (E. I.) & Co. Savannah River Laboratory, Aiken, S. C. Dec 54. Decl. February 16, 1960. Contract AT(07-2)-1. 8p. Order from LC. Mi $1.80, ph $1.80. TID-5382

Study of factors influencing ductility of iron-aluminum alloys. Letter report no. 11, by F. C. Perkins and J. F. Nachman. University of Denver, Denver Research Institute, Denver, Colo. Mar 60. Contract AT(11-1)-742. 7p. Order from LC. Mi $1.80, ph $1.80. TID-5626

A statistical description of distribution of phases. Technical report no. 1, by D. E. Gucer. Brown University, Providence, R. I. Feb 60. Contract AT(30-1)-2394. 26p. Order from LC. Mi $2.70, ph $4.80. TID-5631

Phase equilibria studies of systems involving the alkali and alkaline earth metals. Report no. IV, by F. A. Kanda and A. J. King. Syracuse University, Research Institute, Syracuse, N. Y. Mar 60. Contract AT(30-1)-1910. 64p. Order from LC. Mi $3.90, ph $10.80. TID-5691

Thermal expansion of uranium dioxide. Final report, by F. A. Halden and others. Stanford Research Institute, Menlo Park, Calif. Apr 59. Contract AT(04-3)-115. 24p. Order from LC. Mi $2.70, ph $4.80. TID-5722

Informal letter progress report, March 1960, by J. L. Zambrow. Sylvania-Corning Nuclear Corporation, Bayside, N. Y. Apr 60. Contract AT 30-1-GEN-366. 14p. Order from LC. Mi $2.40, ph $3.30. TID-5747

Zirconium hazards research. Summary report no. 3692, by J. A. Herickes and others. Bureau of Mines, Pittsburgh, Pa. June 58. Contract AT (11-1)-473. 31p. Order from LC. Mi $3.00, ph $6.30. TID-5749

Fundamentals of glass-to-metal bonding. VIII. Wettability of iron by molten sodium disilicate. Technical progress report no. 8, by R. W. Cline and others. Mar 60. Contract AT(11-1)-34. 30p. Order from LC. Mi $2.70, ph $4.80. TID-5754

Letter report no. 13, by D. W. Rudd. Metal Hydrides Inc., Chemical Research Laboratory, Beverly, Mass. May 60. Contract AT(30-1)-2298. 7p. Order from LC. Mi $1.80, ph $1.80. TID-5832

Diffusion in metals. Progress report and publication list, by D. Lazarus. University of Illinois, Urbana, Ill. June 60. Contract AT(11-1)-67. 53p. Order from LC. Mi $3.60, ph $9.30. TID-5934

Growth of metal single crystals and the production of high purity metals. I. Principles, techniques and apparatus, by R. S. Davis and D. W. Batteau. Flow Corporation, Arlington, Mass. Dec 59. Contract AT(30-1)-2049. 41p. Order from LC. Mi $3.00, ph $6.30. TID-5937

Burst-testing of large diameter Zircaloy-2 tubing at 300°F. Nuclear Materials and Equipment Corporation, Apollo, Pa. Mar 60. Contract AT (38-1)-200. 16p. Order from LC. Mi $2.40, ph $3.30. TID-5940

Specialized casting and forming of reactive metal shapes. Period covered May 15, 1959 to October 15, 1959, by T. A. Hamm. Oregon Metallurgical Corporation, Albany, N. Y. 1959. Contract W-31-109-eng-52. 27p. Order from LC. Mi $2.70, ph $4.80. TID-5951

Phase equilibria, kinetic and thermodynamic studies of some rare earth metal oxide and nitride systems. Technical progress report, by L. Eyring and others. State University of Iowa, Iowa City, Iowa. May 60. Contract AT(11-1)-72. 133p. Order from LC. Mi $6.90, ph $21.30. TID-5956

Technical progress report. Part I. High-speed computer program. Part II. Circuit research program. Part III. Mathematical methods. Part IV. Switching circuit theory. Part V. Illiac use and operation. Part VI. IBM 650 use and operation. Part VII. General laboratory information. University of Illinois, Digital Computer Laboratory, Urbana, Ill. Nov 59. Contract AT(11-1)-415. 40p. Order from LC. Mi $3.00, ph $6.30. TID-5972

Letter report no. 14 under AEC contract AT(30-1)-2298, by D. W. Rudd. Metal Hydrides, Inc., Chemical Research Laboratory, Beverly, Mass. June 60. 10p. Order from LC. Mi $1.80, ph $1.80. TID-5982

Informal letter progress report, April 1960. Sylvania-Corning Nuclear Corporatinn, Bayside, N.Y. 1960. 12p. Order from LC. Mi $2.40, ph $3.30. TID-5985

Thermal and structural studies of Ta_2H, Ta_2D, $MgNi_2$, $DyCo_5$ and the Dy-H, Tb-H, Ho-H, Yb-H and KCl-KBr systems. Annual report covering the period May 15, 1959 to May 15, 1960 on application of chemical thermodynamics and related phenomena to the study of alloy formation, by W. E. Wallace. University of Pittsburgh, Pa. June 60. Contract AT(30-1)-647. 35p. Order from LC. Mi $3.00, ph $6.30. TID-6038

Absolute grain boundary energies in copper, by R. L. Fleischer. Massachusetts Institute of Technology, Metals Processing Laboratory, Cambridge, Mass. 1959. Contract AT(30-1)-1310. 5p. Order from LC. Mi $1.80, ph $1.80. TID-6120

Easy glide of lead single crystals, by R. L. Fleischer. Massachusetts Institute of Technology, Metals Processing Laboratory, Cambridge, Mass. 1960. Contract AT(30-1)-1310. 16p. Order from LC. Mi $2.40, ph $3.30. TID-6121

Investigation of factors controlling the mechanical properties of alloys. Seventeenth technical report, by K. Kennedy and E. R. Parker. University of California. Materials Research Laboratory, Berkeley, Calif. May 60. Contract AT (11-1)-34. 17p. Order from LC. Mi $2.40, ph $3.30. TID-6128

Summary technical report for the period January 1, 1955 to March 31, 1955, by J. W. Simmons. National Lead Company of Ohio, Cincinnati, Ohio. Apr 55. Decl. June 18, 1960. Contract AT (30-1)-1156. 170p. Order from OTS. $1.10. TID-10112

Production of high purity yttrium. Monthly progress report for July 1 to August 1, 1958. Bureau of Mines. Northwest Electrodevelopment Experiment Station, Albany, Oreg. 1959. Changed from OFFICIAL USE ONLY July 31, 1959. Contract AT(11-1)-599. 9p. Order from LC. Mi $1.80, ph $1.80. USBM-U-476

Production of high purity yttrium. Monthly progress report for August 1 to September 1, 1958. Bureau of Mines. Northwest Electrodevelopment Experiment Station, Albany, Oreg. 1959. Changed from OFFICIAL USE ONLY July 31, 1959. Contract AT(11-1)-599. 13p. Order from LC. Mi $2.40, ph $3.30. USBM-U-494

Quarterly metallurgical progress report no. 8 for the period of July 1, 1960 to September 30, 1960, by M. L. Wright. United States Department of the Interior, Bureau of Mines, Region I, Albany Metallurgy Research Center, Albany, Oreg. 1960. Contract AT(11-1)-599. 23p. Order from OTS. $1.00. USBM-U-761

Current beryllium literature: A selected bibliography, January 1958--August 1959, by Z. D. Lane. University of California. Lawrence Radiation Laboratory, Livermore, Calif. Sep 59. Contract W-7405-eng-48. 33p. Order from LC. Mi $3.00, ph $6.30. UCRL-5705

Eutectic-diffusion-bonding of plate-type fuel elements containing ceramic fuel, by R. A. Wolfe and others. Westinghouse Electric Corporation, Bettis Atomic Power Laboratory, Pittsburgh, Pa. Oct 60. Contract AT-11-1 GEN-14. 111p. Order from OTS. $2.25. WAPD-211

Measurement of the thermal conductivity of metal-clad uranium oxide rods during irradiation, by I. Cohen and others. Westinghouse Electric Company, Bettis Atomic Power Laboratory, Pittsburgh, Pa. Aug 60. Contract AT-11-1GEN-14. 49p. Order from OTS. $ 1.00. WAPD-228

Interim report on miniature motor tube tests, by K. Jackobson and E. Rau. Westinghouse Electric Corporation, Bettis Atomic Power Division, Pittsburgh, Pa. Oct 58. 34p. Order from LC. Mi $3.00, ph $6.30. WAPD-CTA(MEE)-615

Second interim report on testing of miniature motor tubes, by E. Rau and K. Jakobson. Westinghouse Electric Corporation, Bettis Atomic Power Division, Pittsburgh, Pa. Nov 58. 17p. Order from LC. Mi $2.40, ph $3.30. WAPD-CTA(MEE)-645

An evaluation of the sulfuric acid-sodium nitrite etch for Zircaloy-2, by S. Kass. Westinghouse Electric Corporation, Atomic Power Division, Pittsburgh, Pa. Feb 54. Decl. March 28, 1960. Contract AT-11-1-GEN-14. 13p. Order from OTS. 25 cents. WAPD-MDM-2(Rev.)

The extrusion of a control rod cruciform shape from Zircaloy-1, by J. Halapatz. Westinghouse Electric Corporation, Atomic Power Division, Pittsburgh, Pa. May 54. Decl. with deletions April 30, 1957. Contract AT-11-1-GEN-14. 8p. Order from LC. Mi $1.80, ph $1.80. WAPD-MDM-6(Del.)

CSM-2--Bottom support welding feasibility test. Test report, by R. A. Cooper and A. V. Smocer. Includes appendix I: Procedure for welding PWR core II bottom support welding mockup, by E. E. Callen. Westinghouse Electric Corporation, Atomic Power Division, Pittsburgh, Pa. [1958]. 36p. Order from LC. Mi $3.00, ph $6.30. WAPD-PWR(RD2)378

Zirconium ingots ARC melted from various types of zirconium scrap, by E. S. Foster and W. J. Hurford. Westinghouse Electric Corporation, Atomic Power Division, P ttsburgh, Pa. Nov 51. Decl. February 16, 1960. Contract AT-11-1-GEN-14. 8p. Order from LC. Mi $1.80, ph $1.80. WAPD-RM-96

Production of plate from crystal bar hafnium, by W. J. Hurford and R. J. McClintick. Westinghouse Electric Corporation, Atomic Power Division, Pittsburgh, Pa. May 53. Decl. with deletions May 3, 1957. Contract AT-11-1-GEN-14. 11p. Order from LC. Mi $2.40, ph $3.30. WAPD-RM-181(Del.)

Further work on the diffusion of Krypton-85 from uranium dioxide powder, by A. B. Auskern. Westinghouse Electric Corporation, Bettis Atomic Power Laboratory, Pittsburgh, Pa. Aug 60. Contract AT-11-1-GEN-14. 12p. Order from OTS. 50 cents. WAPD-TM-225

Zirconium highlights. Westinghouse Electric Corporation, Bettis Atomic Power Laboratory, Pittsburgh, Pa. Jan 60. Contract AT-11-1-GEN-14. 20p. Order from LC. Mi $2.40, ph $3.30. WAPD-ZH-22

Uranium alloy newsletter no. 5, by D. W. Lillie. Division of Research, Atomic Energy Commission. Nov 53. Decl. February 16, 1960. 35p. Order from LC. Mi $3.00, ph $6.30. WASH-126

Uranium alloy newsletter no. 7, by D. W. Lillie. Division of Research, Atomic Energy Commission. May 54. Decl. with deletions December 1, 1959. 61p. Order from LC. Mi $3.90, ph $10.80. WASH-154(Del.)

Uranium alloy newsletter no. 8, by D. W. Lille. Division of Research, Atomic Energy Commission. Aug 54. Decl. October 7, 1959. 66p. Order from LC. Mi $3.90, ph $10.80. WASH-155

Uranium alloy newsletter no. 12, by E. Epremian. Division of Research, Atomic Energy Commission. Oct 55. Decl. March 30, 1960. 50p. Order from LC. Mi $3.60, ph $9.30. WASH-199

Minutes of the sixth annual AEC welding committee meeting, Oak Ridge National Laboratory, September 25-26, 1956. Division of Reactor Development, Atomic Energy Commission. Apr 57. Decl. November 23, 1959. Part I - 210p and Part II - 276p. Order from LC. Total price Mi $11.10, ph $37.80. WASH-733 (Pt. 1 & 2)

Thermoelectric nuclear fuel element progress report no. 19, by G. R. Kilp and others. Westinghouse Electric Corporation, Atomic Power Department, Pittsburgh, Pa. Feb 60. Contract AT(30-3)-500. 23p. Order from LC. Mi $2.70, ph $4.80. WCAP-1380

Thermoelectric nuclear fuel element quarterly progress report--January to March, 1960, by W. P. Blankenship and others. Westinghouse Electric Corporation, Atomic Power Department, Pittsburgh, Pa. Apr 60. Contract AT(30-3)-500. 58p. Order from OTS. $1.50. WCAP-1545

Dynamic screening corrosion tests of yankee materials of construction in high temperature borated water, by A. Krieg. Westinghouse Electric Corporation, Atomic Power Department, Pittsburgh Pa. Jan 59. Contract AT(30-3)-222. 61p. Order from LC. Mi $3.90, ph $10.80. YAEC-116

Corrosion rate tests of yankee primary system materials in high temperature dynamic water, by S. J. Cytron. Westinghouse Electric Corporation, Atomic Power Department, Pittsburgh, Pa. Sep 59. Contract AT(30-3)-222. 68p. Order from LC. Mi $3.90, ph $10.80. YAEC-153

Fabrication of a silver-indium-cadmium alloy control rod for the yankee critical experiments, by J. R. Dazen. Westinghouse Electric Corporation, Atomic Power Department, Pittsburgh, Pa. Feb 60. Contract AT(30-3)-222. 25p. Order from LC. Mi $2.70, ph $4.80. YAEC-156

Nuclear Explosions—Peaceful Applications

Preliminary report operation HARDTACK, Phase II. Summary report of strong motion measurements, underground nuclear detonations, by W. M. Adams and others. Defense Atomic Support Agency and U. S. Atomic Energy Commission, Washington, D. C. May 60. 80p. Order from OTS. $2.00. ITR-1711

Peaceful uses of nuclear explosions. A literature search, by H. E. Voress. Technical Information Service Extension, Oak Ridge, Tenn. Apr 60. 6p. Order from OTS. 50 cents. TID-3522(3rd. Rev.)

Peaceful uses of nuclear explosions. A literature search, by H. E. Voress. Technical Information Service Extension, Oak Ridge, Tenn. Nov 60. 11p. Order from OTS. 50 cents. TID-3522(4th Rev.)

Completion report project Chariot-Phase II, Plowshare program U. S. Atomic Energy Commission Cape Thompson Area, Alaska. Holmes & Narver, Inc., Los Angeles, Calif. 1959-1960. Contract AT929-2)-20. 62p. Order from OTS. $1.50. TID-5928

Completion report project Plowboy. Plowshare program. Holmes and Narver, Inc., Los Angeles, Calif. Sep 60. Contract AT(29-2)-20. 30p. Order from OTS. 75 cents. TID-6602

The community impact of peaceful applications of atomic energy, by H. Sandbank. The American Municipal Association, Washington, D. C. Mar 60. 80p. Order from OTS. $1.00. TID-8202

Excavation with nuclear explosives, by G. W. Johnson. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Nov 60. Contract W-7405-eng-48. 30p. Order from OTS. 75 cents. UCRL-5917

Structural response and permanent displacement measurements, by R. H. Sievers, Jr. and others. Headquarters Field Command, Defense Atomic Support Agency, Sandia Base, Albuquerque, N. Mex. Oct 60. 218p. Order from OTS. $3.00. WT-1708

Particle Accelerators and High-Voltage Machines

Particle extraction III, by K. W. Robinson. Cambridge Electron Accelerator, Mass. Feb 59. 13p. Order from LC. Mi $2.40, ph $3.30. AECU-4509

Transient magnet response in the operation of the A. G. S., by L. J. Laslett. Brookhaven National Laboratory, Upton, N. Y. Aug 55. 26p. Order from LC. Mi $2.70, ph $4.80. BNL-4633

Linear accelerator drift tube support, by I. J. Polk. Brookhaven National Laboratory, Upton, N. Y. Feb 56. 10p. Order from LC. Mi $1.80, ph $1.80. BNL-4634

Estimate of radiation levels for the MURA 50 MEV electron accelerator, by W. Smith. Midwestern Universities Research Association, Madison, Wis. Sep 59. Contract AT(11-1)-384. 8p. Order from LC. Mi $1.80, ph $1.80. MURA-507

Use of an electrolytic tank, by C. D. Curtis and R. E. Rothe. Midwestern Universities Research Association, Madison, Wis. Nov 59. Contract AT(11-1)-384. 15p. Order from LC. Mi $2.40, ph $3.30. MURA-531

Magneto-gravitational effects in particle accelerators, by L. W. Jones and A. M. Sessler. Midwestern Universities Research Association, Madison, Wis. Apr 60. Contract AT(11-1)-384. 8p. Order from LC. Mi $1.80, ph $1.80.
MURA-537

Magnetic field calculations using distributed currents, by S. C. Snowdon. Midwestern Universities Research Association, Madison, Wis. Jan 60. Contract AT(11-1)-384. 11p. Order from LC. Mi $2.40, ph $3.30. MURA-553

High energy neutrino experiments with a high intensity FFAG accelerator, by K. R. Symon. Midwestern Universities Research Association, Madison, Wis. Jan 60. Contract AT(11-1)-384. 10p. Order from LC. Mi $2.40, ph $3.30.
MURA-554

Electromagnetic fields in a donut space, by W. N. Wong. Midwestern Universities Research Association, Madision, Wis. Jan 60. Contract AT(11-1)-384. 26p. Order from LC. Mi $2.70, ph $4.80. MURA-555

Some notes on the kinematics of high energy nucleon-nucleon collisions, by S. P. Rosen. Midwestern Universities Research Association, Madison, Wis. Mar 60. Contract AT(11-1)-384. 30p. Order from LC. Mi $2.70, ph $4.80.
MURA-563

Schwarz-Christoffel transformations pertaining to magnet edges or peelers, by L. J. Laslett. Midwestern Universities Research Association, Madison, Wis. Apr 60. Contract AT(11-1)-384. 17p. Order from LC. Mi $2.40, ph $3.30.
MURA-567

Linear oscillations about off-center, fixed point orbits, by M. M. Gordon. Midwestern Universities Research Association, Madison, Wis. [nd]. Contract AT(11-1)-384. 13p. Order from OTS. 50 cents. MURA-589

A neutrino beam design, by L. W. Jones. Midwestern Universities Research Association, Madison, Wis. Aug 60. Contract AT(11-1)-384. 10p. Order from OTS. 50 cents. MURA-590

Relaxation calculation of integral scaling magnetic fields produced by distributed currents, by S. C. Snowdon. Midwestern Universities Research Association, Madison, Wis. Oct 60. Contract AT(11-1)-384. 12p. Order from OTS. 50 cents.
MURA-591

A proposal for the study of long-time association, by G. Parzen. Midwestern Universities Research Association, Madison, Wis. Oct 60. Contract AT(11-1)-384. 6p. Order from OTS. 50 cents. MURA-592

Quarterly report of the laboratory director for the period January 1, 1960 to March 31, 1960. Midwestern Universities Research Association, Madison, Wis. June 59. 5p. Order from LC. Mi $1.80, ph $1.80. TID-5784

High current electron accelerator, by N. Christofilos. University of California. Lawrence Radiation Laboratory, Livermore, Calif. Jan 59. Changed from OFFICIAL USE ONLY February 15, 1960. 23p. Order from LC. Mi $2.70, ph $4.80.
UCRL-5463-T

A radiofrequency separator for high-energy particles, by M. L. Good. University of California. Lawrence Radiation Laboratory, Berkeley, Calif. Oct 59. Contract W-7405-eng-48. 19p. Order from LC. Mi $2.40, ph $3.30. UCRL-8929

Some problems in planning for future high energy proton accelerators, by D. L. Judd. University of California. Lawrence Radiation Laboratory, Berkeley, Calif. Jan 60. Contract W-7405-eng-48. 17p. Order from LC. Mi $2.40, ph $3.30.
UCRL-9094

Physics and Mathematics

The mechanism of the direct interaction process at intermediate energies, by R. J. Griffiths and R. M. Eisberg. University of Minnesota. School of Physics, Minneapolis, Minn. [1958]. 24p. Order from LC. Mi $3.70, ph $4.80.
AECU-4311

Relativistic self-consistent calculation for the iron atom, by S. Cohen. RAND Corporation, Santa Monica, Calif. June 59. Contract AT(11-1)-135. 24p. Order from LC. Mi $2.70, ph $4.80.
AECU-4342

Annual research report. Massachusetts Institute of Technology, Laboratory of Chemistry and Solid-State Physics, Cambridge, Mass. July 59. 69p. Order from LC. Mi $3.90, ph $10.80.
AECU-4343

Measurements of average heat-transfer coefficients for helium and hydrogen flowing in smooth tantalum tubes at high surface temperatures, by H. J.

Newman. Los Alamos Scientific Laboratory, N. Mex. [1959]. Contract W-7405-eng-36. 26p. Order from LC. Mi $2.70, ph $4.80.
AECU-4507

Ideal gas thermodynamic properties of detonation products, by C. L. Mader. Los Alamos Scientific Laboratory, Los Alamos, N. Mex. Sep 59. 206p. Order from LC. Mi $9.30, ph $31.80.
AECU-4508

Thermodynamic properties of detonation products, by C. L. Mader. Los Alamos Scientific Laboratory, Los Alamos, N. Mex. Apr 60. 57p. Order from LC. Mi $3.50, ph $9.30.
AECU-4508(Suppl)

Finite amplitude stress waves in rocks, by D. R. Grine. Stanford Research Institute, Poulter Laboratories, Menlo Park, Calif. Oct 59. 64p. Order from LC. Mi $3.90, ph $10.80.
AECU-4518

Technical progress report. Part I. High-speed computer program. Part II. Mathematical methods. Part III. Illiac use and operation. Part IV. IBM 650 use and operation. Part V. General laboratory information. University of Illinois. Digital Computer Laboratory, Urbana, Ill. July 59. Contracts AT(11-1)-415 and Nonr-1834(15). 22p. Order from LC. Mi $2.70, ph $4.80.
AECU-4531

Technical progress report. Part I. High-speed computer program. Part II. Mathematical methods. Part III. Illiac use and operation. Part IV. IBM 650 use and operation. Part V. General laboratory information, University of Illinois, Digital Computer Laboratory, Urbana, Ill. Aug 59. Contracts AT(11-1)-415 and Nonr-1834(15). 36p. Order from LC. Mi $3.00, ph $6.30.
AECU-4532

A fast hyperfragment produced by a heavy primary cosmic ray, by U. Camerini and others. University of Wisconsin, Madison, Wis. [1959]. Contract AT(11-1)-64. 3p. Order from LC. Mi $1.80, ph $1.80.
AECU-4533

Diffusion in a temperature gradient. Technical report no. 16, by J. S. Koehler. University of Illinois, Urbana, Ill. June 59. Contract AT(11-1)-182. 10p. Order from LC. Mi $1.80, ph $1.80.
AECU-4534

The low energy photodisintegration of ^{3}H and ^{3}He and neutron-deuteron scattering, by L. M. Delves. Massachusetts Institute of Technology, Laboratory for Nuclear Science, Cambridge, Mass. [1959]. Contract AT(30-1)-2098. 18p. Order from LC. Mi $2.40, ph $3.30.
AECU-4565

Research and investigation leading to methods of generating and detecting radiation in the 100 to 1000 micron wavelength range of the spectrum. Quarterly progress report no. 15 for September 1 to December 1, 1959, by P. D. Coleman and others. University of Illinois, Electrical Engin neering Research Laboratory, Urbana, Ill. Jan 60. Contract AT(11-1)-392. 61p. Order from LC. Mi $3.60, ph $9.30.
AECU-4661

Low energy nuclear physics. Second annual report for the period February 1, 1959 to January 31, 1960, by P. S. Jastram. Ohio State University, Research Foundation, Columbus, Ohio. Jan 60. Contract AT(11-1)-605. 122p. Order from LC. Mi $6.30, ph $19.80.
AECU-4676

The snap-II power conversion system. Topical report no. 4. Turbine design and testing, by E. N. Poulos and E. R. Furman. Thompson Ramo Wooldridge Inc., Cleveland, Ohio. Jan 60. Contract AT-11-1-GEN-8. 73p. Order from LC. Mi $4.50, ph $12.30.
AECU-4686

Time variation of thermodynamic parameters of a gas in the region of a shock front. Progress report no. III, by E. J. Eastmond and others. Brigham Young University, Provo, Utah. Nov 59. Contract AT(04-3)-67. 59p. Order from LC. Mi $3.60, ph $9.30.
AECU-4687

The application of nuclear energy to agriculture, Annual report. Inter-American Institute of Agricultural Sciences. Turrialba, Costa Rica. Mar 60. Contract AT(30-1)-2043. 50p. Order from LC. Mi $3.30, ph $7.80.
AECU-4731

Physics division summary report for July - August 1960, by M. Hamermesh. Argonne National Laboratory, Argonne, Ill. 1960. Contract W-31-109-eng-38. 21p. Order from OTS. 75 cents.
ANL-6190

Thermal stresses in concentrically heated hollow cylinders. Supplemental data on coefficients of thermal expansion, modulus of eleasticity and poisson's ratio as functions of temperature, by J. C. Heap. Argonne Natinaal Laboratory, Argonne, Ill. Oct 60. Contract W-31-109-eng-38. 38p. Order from OTS. $1.00.
ANL-6224

Bubble chamber safety meeting, by J. M. Harrer. Argonne National Laboratory, Argonne, Ill. June 60. Contract W-31-109-eng-38. 18p. Order from OTS. 50 cents.
ANL-6225

Multigroup diffusion theory formulation of the calculation of the mean square slowing down distance in an infinite medium, by B. J. Toppel. Argonne National Laboratory, Argonne, Ill. Oct 60. Contract W-31-109-eng-38. 13p. Order from OTS. 50 cents. ANL-6226

Special lectures on the physical foundation of reactor analysis, by P. J. Persiani. Argonne National Laboratory, Argonne, Ill. Oct 60. Contract W-31-109-eng-38. 40p. Order from OTS. $1.00. ANL-6227

The fission energetics of Th^{232}, by A. B. Smith and others. Argonne National Laboratory, Argonne, Ill. Nov 60. Contract W-31-109-eng-38. 20p. Order from OTS. 50 cents. ANL-6247

Reflector and pressure vessel cooling and thermal stress analysis on the IBM 650, by J. D. Love and R. L. Caton. Alco Products, Inc., Schenectady, N.Y. Mar 59. Contract AT(30-3)-326. 37p. Order from LC. Mi $3.00, ph $6.30. APAE Memo-184

Nuclear data tape program (IBM 704 Program NDTP), by K. A. Paine. General Electric Co., Aircraft Nuclear Propulsion Department, Cincinnati, Ohio. Dec 57. Contracts AF 33(600)-38062 and AT (11-1)-171. 30p. Order from OTS. 75 cents. APEX-574

Table of gamma-rays emitted by radioactive nuclei. Arranged in order of increasing energy, by E. der Mateosian and M. McKeown. Brookhaven National Laboratory, Upton, N. Y. May 60. 24 p. Order from OTS. $3.00. BNL 605 (T-177)

Neutron cross section evaluation group. Newsletter no. 1, June 1960, by R. Sher and S. Moore. Brookhaven National Laboratory, Upton, Long Island, New York. June 60. 6p. Order from OTS. 50 cents. BNL-607 (T-178)

A study of the wind profile in the lowest 400 feet of the atmosphere. Progress report no. 6, January 16, 1960 to May 15, 1960, by I. A. Singer and L. J. Tick. Brookhaven National Laboratory, Upton, Long Island, N. Y. 12p. Order from OTS. 50 cents. BNL-615 (T-184)

Neutron cross section evaluation group. Newsletter no. 2, October 1960, by S. Moore and others. Brookhaven National Laboratory, Upton, Long Island, N. Y. Oct 60. 8p. Order from OTS. 50 cents. BNL-634 (T-197)

Vapor pressure of the Bi-BiI_3 system. Period covered: November 1, 1951 to September 30, 1952, by R. L. Von Berg and W. A. Chantry. Cornell University, Ithaca, N. Y. 1952. Decl. June 24, 1959. Contract AT-30-2-GEN-16. 29p. Order from LC. Mi $2.70, ph $4.80. BNL-4152

Preliminary design report for the NMSR pressurized water loop at ORR, by L. T. Dudley and others. Oak Ridge National Laboratory, Oak Ridge, Tenn. Oct 58. 41p. Order from LC. Mi $3.60, ph $9.30. CF-58-10-21

The fast fission factor, by G. R. Hoke. Oak Ridge National Laboratory, Oak Ridge, Tenn. Sep 59. 46p. Order from LC. Mi $3.30, ph $7.80. CF-59-9-61

Thermal shock of HRT flanges, by P. P. Holz. Oak Ridge National Laboratory, Oak Ridge, Tenn. Sep 59. Contract W-7405-eng-26. 9p. Order from LC. Mi $1.80, ph $1.80. CF-59-9-114

An IBM-704 code for studying particle orbits in cyclotron fields, by H. C. Owens and T. A. Welton. Oak Ridge National Laboratory, Oak Ridge, Tenn. Nov 59. Contract W-7405-eng-26. 113p. Order from LC. Mi $6.00, ph $18.30. CF-59-11-3

EGCR coolant purification. Treatment of buffer helium from water or oil seals, by P. A. Haas and C. D. Scott. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jan 60. 11p. Order from LC. Mi $2.40, ph $3.30. CF-60-1-46, 2nd.

Burnup of beryllium by fast neutron reactions, by A. M. Perry. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jan 60. 3p. Order from LC. Mi $1.80, ph $1.80. CF-60-1-56

Protection of space vehicles from meteorite penetration, by R. J. Hefner and P. G. Lafyatis. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jan 60. 28p. Order from LC. Mi $2.70, ph $4.80. CF-60-1-67

Some comments on the ioffe experiment, by A. Simon. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jan 60. Contract W-7405-eng-26. 13p. Order from LC. Mi $2.40, ph $3.30. CF-60-1-72

IBM-704 Gaussian-integration routines, by M. P. Lietzke. Oak Ridge National Laboratory, Oak Ridge, Tenn. Mar 60. 12p. Order from LC. Mi $2.40, ph $3.30. CF-60-3-48

Polfit, A 704 program for polynomial least squares fitting, by M. H. Lietzke and M. P. Lietzke. Oak Ridge National Laboratory, Oak Ridge, Tenn. May 60. 16p. Order from LC. Mi $2.40, ph $3.30. CF-60-3-129

Determination of $\bar{\eta}$ by comparison of $\eta\sigma_a$ for U^{233} and Pu^{239} with $\eta\sigma_a$ for U^{235} in a flux trap critical assembly, by R. Gwin and D. W. Magnuson. Oak Ridge National Laboratory, Oak Ridge, Tenn. Apr 60. Contract W-7405-eng-26. 16p. Order from LC. Mi $2.40, ph $3.30. CF-60-4-11

A simple formula for computing fission product thermal cross sections and resonance integrals, by C. W. Nestor. Oak Ridge National Laboratory, Oak Ridge, Tenn. Apr 60. 14p. Order from LC. Mi $2.40, ph $3.30. CF-60-4-30

GAP: The IBM 704 grid analysis program, by F. J. Witt. Oak Ridge National Laboratory, Oak Ridge, Tenn. May 60. Contract W-7405-eng-26. 18p. Order from LC. Mi $2.40, ph $3.30. CF-60-4-69

Neutron thermalization and diffusion in pulsed media, by S. N. Purohit. Oak Ridge National Laboratory, Oak Ridge , Tenn. July 60. Contract W-7405-eng-26. 45p. Order from LC. Mi $3.30, ph $7.80. CF-60-7-32

Time-dependent thermal-neutron energy spectra in a monoatomic heavy gas, by S. N. Purohit. Oak Ridge National Laboratory, Oak Ridge, Tenn. July 60. 36p. Order from LC. Mi $3.00, ph $6.30. CF-60-7-44

Progress report for April, May, June 1959 to the United States Atomic Energy Commission. Columbia University, Pupin Cyclotron Laboratory and George B. Pegram Laboratory, New York, N. Y. 1959. Contract AT-30-1-GEN-72. 58p. Order from LC. Mi $3.60, ph $9.30. CU-194

Intermediate image pair spectrometer measurements of the electromagnetic radiations from some light nuclei, by K. E. Eklund. Department of Physics, Columbia University, New York, N. Y. May 60. Contract AT(30-1)-GEN-72. 112p. Order from OTS. $2.50. CU(PNPL)-196

The neutrino--a contribution to the memorial volume to Wolfgang Paull, by C. S. Wu. Columbia University, Pupin Cyclotron Laboratory, and George B. Pegram Laboratory, New York, N. Y. June 60. Contract AT-30-1-GEN-72. 105p. Order from LC. Mi $5.70, ph $16.80. CU-197

Progress report for July, August, September 1959 to the United States Atomic Energy Commission, Columbia University, Pegram Nuclear Physics Laboratories, New York, N. Y. 1959. Contract AT-30-1-GEN-72. 50p. Order from LC. Mi $3.30, ph $7.80. CU(PNPL)-199

Nuclear electric monopole transitions in O^{16}, Ca^{40}, Ge^{72} and Zr^{90}, by M. Nessin. Columbia University, Department of Physics, New York, N. Y. May 60. Contract AT(30-1)-GEN-72. 93p. Order from OTS. $2.25. CU(PNPL)-201

IBM 650 routine VI temperature distribution in fuel elements, by J. C. Jensen. E. I. du Pont de Nemours & Company, Explosives Department, Atomic Energy Division, Technical Division, Savannah River Laboratory, Aiken, S. C.. Sep 60. Contract AT(07-2)-1. 48p. Order from OTS. $1.25. DP-512

Reactor stability, by D. S. St. John. E. I. du Pont de Nemours & Company, Explosives Department, Atomic Energy Division, Technical Division, Savannah River Laboratory, Aiken, S. C. Sep 60. Contract AT(07-2)-1. 88p. Order from OTS. $2.00. DP-517

Long-wavelength beam instability, M. N. Rosenbluth. General Atomic Division, General Dynamic Corporation, San Diego, Calif. Apr 60. 14p. Order from LC. Mi $2.40, ph $3.30. GA-1376

Safe geometries and mass at assays below five per cent U^{235}, by J. L. Feuerbacher. Goodyear Atomic Corporation, Portsmouth, Ohio. May 59. 9p. Order from LC. Mi $1.80, ph $1.80. GAT-DM-769

IBM program for fitting data to simple exponential curves of the form $y = ab^x$, by T. B. Patterson. Goodyear Atomic Corporation, Portsmouth, Ohio. Nov 59. 4p. Order from LC. Mi $1.80, ph $1.80. GAT-DM-788

Likelihood ratio test, by D. L. Thomas. Goodyear Atomic Corporation, Portsmouth, Ohio. Mar 60. 6p. Order from LC. Mi $1.80, ph $1.80. GAT-DM-821

Absorption correction calculation, by D. L. Thomas. Goodyear Atomic Corporation, Portsmouth, Ohio. Apr 60. 13p. Order from LC. Mi $2.40, ph $3.30. GAT-DM-829

Performance -- two-phase pressure drop, burnout, and hydraulic oscillation of an inclined test

section with net steam generation at 1000 PSIA, by S. Levy and C. L. Swan. General Electric Company, Atomic Power Equipment Department, San Jose, Calif. Aug 59. Contract AT(04-3)-189, PA#5. 25p. Order from OTS. 50 cents.
GEAP-3228 (Rev. 1)

Method for analyzing low-enrichment light-water cores. Supplementary study related to BONUS and nuclear superheat programs, by R. W. Deutsch. General Nuclear Engineering Corporation, Dunedin, Fla. Oct 60. Contract AT(40-1)-2674. 43p. Order from OTS. $1.00.
GNEC-133

Physics Unit - Applied researcy subsection technical activities report for April 1953, by J. E. Faulkner and others. General Electric Company, Hanford Atomic Porducts Operation, Richland, Wash. May 53. Decl. March 3, 1960. 15p. Order from LC. Mi $2.40, ph $3.30.
HW-27921

The resonance escape probability of thorium slugs, by G. W. Stuart, Jr. and R. K. Cole. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Aug 54. Decl. February 6, 1956. 3p. Order from LC. Mi $1.80, ph $1.80.
HW-32672

The method of successive generations, by G. W. Stuart and R. W. Woodruff. Hanford Atomic Products Operation, Richland, Wash. Jan 55. Decl. August 18, 1960. Contract W-31-109-Eng-52. 38p. Order from OTS. 40 cents.
HW-33566 REV

Resonance capture of neutrons in metal and oxide cylinders, by M. V. Davis. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. July 55. Decl. June 10, 1960. 9p. Order from LC. Mi $1.80, ph $1.80.
HW-38235

Fading effect in Eastman NTA emulsion, by E. C. Watson. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Mar 57. 5p. Order from LC. Mi $1.80, ph $1.80.
HW-49444

Effects of in-reaction test loops on PRTR operation and program, by R. E. Peterson. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Mar 59. Contract W-31-109-Eng-52. 15p. Order from LC. Mi $2.40, ph $3.30.
HW-59691

Neutron age in graphite-water lattices, by D. E. Simpson. General Electric Company, Hanford Atomic Product Operations, Richland, Wash. Oct 59. Contract AT(45-1)-1350. 3p. Order from LC. Mi $1.80, ph $1.80.
HW-62501

Equations of state for steam-water mixtures and some representative applications analysis, by W. J. Love. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Apr 60. 23p. Order from LC. Mi $2.70, ph $4.80.
HW-62858 (Rev. 1)

Statistical interrogation of data for alternative models, by R. L. Basmann and L. G. Waters. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. May 59. 79p. Order from LC. Mi $4.50, ph $12.30.
HW-SA-1706

Fission product release from heated uranium (thesis), by R. K. Hilliard. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. 1960. Contract AT(45-1)-1350. 64p. Order from LC. Mi $3.90, ph $10.80.
HW-SA-1836

Coordinates for calculating vibrational frequencies in chain molecules, by H. L. McMurry, Phillips Petroleum Company, Atomic Energy Division, Idaho Falls, Idaho. Aug 60. Contract AT(10-1)-205. 50p. Order from OTS. $1.25.
IDO-16605

High-energy potential scattering, by P. J. Lynch. Ames Laboratory, Iowa State University of Science and Technology, Ames, Iowa. Sep 60. Contaact W-7405-eng-82. 151p. Order from OTS. $2.75.
IS-203

Report of the nuclear physics section for June, July, August 1954. Knolls Atomic Power Laboratory, Schenectady, N. Y. 1954. Decl. February 24, 1960. Contract W-31-109-Eng-52. 55p. Order from LC. Mi $3.00, ph $6.30.
KAPL-1210

Almost linearly optimum combination of unbiased estimates, by M. Halperin. General Electric Company, Knolls Atomic Power Laboratory, Schenectady, N. Y. Jan 60. Contract W-31-109-Eng-52. 9p. Order from OTS. 50 cents.
KAPL-2068

Digital computation of space-time variation of neutron fluxes, by E. L. Wachspress. General Electric Company, Knolls Atomic Power Laboratory, Schenectady, N. Y. Oct 60. Contract W-31-109-Eng-52. 33p. Order from OTS. $1.00.
KAPL-2090

Microscopic effects in multiphase mediums (neutron self-shielding), by C. H. Randall. Knolls Atomic Power Laboratory, Schenectady, N. Y. May 60. Contract W-31-109-Eng-52. 136p. Order from LC. Mi $6.90, ph $21.30.
KAPL-M-CHR-2

Sourceless startup--a machine code for computing low-source reactor startups, by D. B. MacMillian. Knolls Atomic Power Laboratory, Schenecday, N. Y. June 60. Contract W-31-109-Eng-52. 23p. Order from LC. Mi $2.70, ph $4.80.
KAPL-M-DBM-1

The constant-period approximation for numerical solution of the space-independent reactor kinetics equations, by D. B. MacMillan. Knolls Atomic Power Laboratory, Schenectady, N. Y. July 60. Contract W-31-109-eng-52. 8p. Order from LC. Mi $1.80, ph $1.80. KAPL-M-DBM-2

HILO--A steady state reactor analysis program, by A. E. Kakretz and L. B. Shannon. Knolls Atomic Power Laboratory, Schenectady, N.Y. Apr 60. Contract W-31-109-Eng-52. 108p. Order from LC. Mi $5.70, ph $16.80.
KAPL-M-DIG-TD-10

A stability analysis of the finite difference representation of the energy equation, by D. C. Maxwell. Knolls Atomic Power Laboratory, Schenectady, N. Y. May 60. Contract W-31-109-Eng-52. 55p. Order from LC. Mi $3.60, ph $9.30.
KAPL-M-DIG-TD-12

Effective thermal and epithermal fission fragment absorption cross-sections, by E. C. Hansen and C. R. Greenhow. Knolls Atomic Power Laboratory, Schenectady, N. Y. Oct 59. Contract W-31-109-Eng-52. 19p. Order from LC. Mi $2.40, ph $3.30. KAPL-M-ECH-3

An improved generalized analysis of fission fragment poisoning--thermal and resonance fission fragment cross sections, by E. C. Hansen and C. R. Greenhow. Knolls Atomic Power Laboratory, Schenectady, N. Y. July 60. Contract W-31-109-Eng-52. 43p. Order from LC. Mi $3.30, ph $7.80. KAPL-M-ECH-7

A probability distribution for random grouping of items from a lot and its use in providing assurance on the percent of defective groups, by M. Halperin and G. L. Burrows. Knolls Atomic Power Laboratory, Schenectady, N. Y. June 60. Contract W-31-109-Eng-52. 18p. Order from LC. Mi $2.40, ph $3.30. KAPL-M-GLB-2

Kare input, by J. A. Archibald, Jr. Knolls Atomic Power Laboratory, Schenectady, N.Y. Apr 60. Contract W-31-109-Eng-52. 101p. Order from LC. Mi $5.70, ph $16.80.
KAPL-M-JA-6

Kare general mesh data, by J. A. Archibald, Jr. Knolls Atomic Power Laboratory, Schenectady, N. Y. May 60. Contract W-31-109-Eng-52. 25p. Order from LC. Mi $2.70, ph $4.80.
KAPL-M-JA-7

Equations for the WOXX cross-section routine of the kare system, by J. A. Archibald, Jr. Knolls Atomic Power Laboratory, Schenectady, N. Y. May 60. Contract W-31-109-Eng-52. 63p. Order from LC. Mi $3.90, ph $10.80.
KAPL-M-JA-8

Utilization of tapes in the kare system, by J. A. Archibald, Jr and others. Knolls Atomic Power Laboratory, Schenectady, N. Y. June 60. Contract W-31-109-Eng-52. 16p. Order from LC. Mi $2.40, ph $3.30. KAPL-M-JA-9

Flux peaking formulae for some two dimensional systems, by J. H. Smith. Knolls Atomic Power Laboratory, Schenectady, N. Y. Feb 60. 13p. Order from LC. Mi $2.40, ph $3.30.
KAPL-M-JHS-7

Bending stresses in a pressure vessel with an integral flat head, by L. Deagle. Knolls Atomic Power Laboratory, Schenectady, N. Y. 1960. Contract W-31-109-Eng-52. 19p. Order from LC. Mi $2.40, ph $3.30. KAPL-M-LD-5

Distributed reactivity coefficients in a PMA slab core. Measurement and analysis, by N. E. French and others. Knolls Atomic Power Laboratory, Schenectady, N. Y. Feb 60. Contract W-31-109-Eng-52. 50p. Order from LC. Mi $3.30, ph $7.80. KAPL-M-MLS-12

Model and equations for digital analysis of a mixed natural and forced circulation power plant, by A. J. Arker and T. R. Greene. Knolls Atomic Power Laboratory, Schenectady, N. Y. Mar 60. Contract W-31-109-Eng-52. 43p. Order from LC. Mi $3.30, ph $7.80. KAPL-M-NPA-9

HFC: An IBM 704 digital computer program to calculate heat transfer data obtained from out-of-pile tests on fuel elements, by R. D. Burgess and C. L. Gregory, Knolls Atomic Power Laboratory, Schenectady, N. Y. May 60 . 97p. Order from LC. Mi $5.40, ph $15.30.
KAPL-M-S3G-RES-70

Method for determining fuel element surface temperature in the hot channel containing bulk steam walls film flanketed with superheated vapor, by J. E. Kalinowski. Knolls Atomic Power Laboratory, Schenectady, N. Y. Mar 60. Contract W-31-109-Eng-52. 17p. Order from LC. Mi $2.40, ph $3.30. KAPL-S3G-M-RES-72

A survey of small core hydrogen moderated reactors, by W. B. Wright, Jr. Knolls Atomic Power Laboratory, Schenectady, N. Y. Aug 55. Decl. January 4, 1960. Contract W-31-109-Eng-52. 15p. Order from LC. Mi $2.40, ph $3.30. KAPL-M-WBW-1

Opacity of air at high altitudes and high temperature, by B. Kivel and H. Mayer. Los Alamos Scientific Laboratory, Los Alamos, N. Mex. Aug 54. Decl. June 6, 1960. Contract W-7405-eng-36. 48p. Order from LC. Mi $3.30, ph $7.80. LA-1738

A gamma ray sensitive fuel level detector for a homogeneous reactor, by D. M. Holm. Los Alamos Scientific Laboratory, University of California, Los Alamos, N. Mex. July 60. Contract W-7405-ENG-36. 22p. Order from OTS. 50 cents. LA-2458

Proposed method of measuring thermal diffusivity at high temperature, by R. D. Cowan. Los Alamos Scientific Laboratory, University of California, Los Alamos, N. Mex. Aug 60. Contract W-7405-ENG-36. 48p. Order from OTS. $1.25. LA-2460

On the continuum radiation in ionized gases, by N. Balazs. Princeton University, Project Matterhorn, Princeton, N. J. July 60. Contract AT(30-1)-1238. 25p. Order from OTS. 75 cents. MATT-49

Preliminary technical manual. Loading, shipping and testing procedures for task 2 isotopic powered thermoelectric generator, by M. J. Reilly. Martin Company, Nuclear Division, Baltimore, Md. Mar 60. Contract AT(30-3)-217. 42p. Order from OTS. $1.00. MND-P-2316

Nuclear 1.0 watt power supply for space application. Final report - Subtask 5.6, by D. J. Knighton. Martin Company, Baltimore Md. June 60. Contract AT(30-3)-217. 49p. Order from OTS. $1.25. MND-P-2354

Curium fueled generators for lunar and space missions. Preliminary safety analysis report, by C. O. Riggs. Martin Company, Baltimore, Md. June 60. Contract AT(30-3)-217. 49p. Order from OTS. $1.50. MND-P-2366

13-watt curium fueled thermoelectric generator for a six-month space mission, Final report - Subtask 5.8, by J. Bloom. Martin Company, Baltimore, Md. July 60. Contract AT(30-3)-217. 45p. Order from OTS. $1.25. MND-P-2373

13-watt curium-fueled thermoelectric generator for hard lunar impact mission. Final report - Subtask 5.8, by J. Bloom. Martin Company, Baltimore, Md. Aug 60. Contract AT(30-3)-217. 50p. Order from OTS. $1.50. MND-P-2374

Report on shielding the MURA high intensity 50 Mev electron accelerator, by J. H. Smith. Midwestern Universities Research Association, Madison, Wis. June 58. Contract AT(11-1)-384. 15p. Order from LC. Mi $2.40, ph $3.30. MURA-408

On Sturrock's perturbation theory, by W. N. Wong. Midwestern Universities Research Association, Madison, Wis. Jan 60. Contract AT(11-1)-384. 17p. Order from LC. Mi $2.40, ph $3.30. MURA-556

Measurement of zero power frequency response of the SRE, by J. G. Lundholm, Jr. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Nov 60. Contract AT(11-1)-GEN-8. 58p. Order from OTS. $1.25. NAA-SR-3762

Measurement of the SRE power coefficients and reactor parameters utilizing the oscillation techniques, by C. W. Griffin and J. G. Lundholm, Jr. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Nov 60. Contract AT(11-1)-GEN-8. 54p. Order from OTS. $1.25. NAA-SR-3763

Calibration of the SRE shim rods by the oscillation method, by C. W. Griffin and J. G. Lundholm, Jr. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Nov 60. Contract AT(11-1)-GEN-8. 25p. Order from OTS. 50 cents. NAA-SR-3764

Numerical solution of quasi-linear equations, by E. R. Cohen and H. P. Flatt. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Oct 60. Contract AT(11-1)-GEN-8. 22p. Order from OTS. $1.00. NAA-SR-5178

An enriched UO_2 ZrH critical assembly, by M. V. Davis and others. Atomics International. A Division of North American IAviation, Inc., Canoga Park, Calif. Nov 60. Contract AT(11-1)-GEN-8. 34p. Order from OTS. $1.00.
NAA-SR-5610

Flux evaluation of MTR irradiated NAA-15 assemblies, by M. Roy. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Apr 58. 3p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-2654

Effect of temperature upon the energy absorption in the organic moderator-coolant in the OMRE, by V. Keshishian. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. July 58. 6p. Order from LC. Mi $1.80, ph $1.80.
NAA-SR-Memo-2902

Energy absorption in the coolant of a 555 Mw thermal OMR, by V. Keshishian. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Nov 58. 5p. Order from LC. Mi $1.80, ph $1.80.
NAA-SR-Memo-3245

The Hemad code, by B. L. Scott. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Aug 59. 12p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-4220

Review of ultrasonic theory and application with regard to feasibility of operation in organic reactors, by D. G. Lilja. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Nov 59. 6p. Order from LC. Mi $1.80, ph $1.80.
NAA-SR-Memo-4595

Thermionic nuclear fuels for direct conversion reactors, by S. M. Toy. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Nov 59. 8p. Order from LC. Mi $1.80, ph $1.80.
NAA-SR-Memo-4692

Analysis of neutron slowing down from a finite plane fission source for uniform and non-uniform source distributions, by H. Alter. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Mar 60. 21p. Order from LC. Mi $2.70, ph $4.80.
NAA-SR-Memo-5081

Special heat transfer phenomena for supercritical fluids, by K. Goldmann. Nuclear Development Corporation of America, White Plains, N. Y. Nov 1 and 2, 1956. Decl. July 7, 1960. 18p. Order from OTS. 50 cents. NDA-2-31

The transmission of gamma rays at slant incidence through slabs of various materials in shielding, by L. Pullman. Nuclear Development Corporation of America, White Plains, N. Y. Oct 56. Decl. March 31, 1960. 109p. Order from LC. Mi $5.70, ph $16.80. NDA-2056-6

Renupak, an IBM-704 program for neutron moment calculations, by J. Certaine and others. Nuclear Development Corporation of America, White Plains, N. Y. Dec 59. Contract AT(30-1)-2303. 22p. Order from LC. Mi $2.40, ph $3.30.
NDA-2120-3

Decay of μ^- mesons bound in the K-shell of light nuclei, by H. Uberall. Carnegie Insitute of Technology, Pittsburgh, Pa. Feb 60. Contract AT(30-1)-882. 43p. Order from LC. Mi $3.30, ph $7.80. NYO-2239

Reaction $p + p \rightarrow \pi^+ + p + n$ with polarized protons, by R. L. McIlwain. Carnegie Institute of Technology, Pittsburgh, Pa. May 60. Contract AT (30-1)-882. 80p. Order from LC. Mi $4.50, ph $12.30. NYO-2240

Internal pairs following π^- capture in hydrogen, by M. Derrick, and others. Carnegie Institute of Technology, Pittsburgh, Pa. June 60. Contract AT(30-1)-882. 26p. Order from LC. Mi $2.70, ph $4.80. NYO-2241

Magneto-hydrodynamic shock structure without collisions, by C. S. Morawetz. New York University, Institute of Mathematical Sciences, New York, N. Y. Mar 60. Contract AT(30-1)-1480. 65p. Order from LC. Mi $3.90, ph $10.80. NYO-2885

A note on significance of sums in floating-point arithmetic, by I. N. Rabinowitz. Princeton University, Project Matterhorn, Princeton, N. J. Nov 58. Contract AT(30-1)-1238. 3p. Order from LC. Mi $1.80, ph $1.80. NYO-2389

A scheme for particle separation in high energy beams, by H. M. Brody. University of Pennsylvania, Philadelphia, Pa. Feb 60. Contract AT (30-1)-2171. 6p. Order from LC. Mi $1.80, ph $1.80. NYO-2180

Finite automata, pattern recognition and perceptrons, by H. Keller. New York University, Atomic Energy Commission Computing and

Applied Mathematics Center, New York, N. Y. Mar 60. Contract AT(30-1)-1480. 50p. Order from LC. Mi $3.30, ph $7.80. NYO-2884

Progress report and budget proposal, by J. M. Miller. Columbia University, New York, N. Y. June 60. Contract AT(30-1)-1019. 6p. Order from LC. Mi $1.80, ph $1.80. NYO-7336

Natural alpha radioactivity in medium-heavy elements. Thesis, by R. D. Macfarlane. Carnegie Institute of Technology, Pittsburgh, Pa. May 59. Contract AT (30-1)-844. 161p. Order from OTS. $2.75. NYO-7687

Proposal for a small plasma source. Technical memo no. 59, by F. F. Chen. Princeton University, Project Matterhorn, Princeton, N. J. Mar 58. Changed from OFFICIAL USE ONLY February 15, 1960. Contract AT(30-1)-1238. 32p. Order from LC. Mi $3.00, ph $6.30. NYO-8061

A proposal for a linear plasma source L-2. Technical memo no. 68, by F. Chen and others. Princeton University, Project Matterhorn, Princeton, N. J. Feb 59. Changed from OFFICIAL USE ONLY February 15, 1960. Contract AT(30-1)-1238. 52p. Order from LC. Mi $3.60, ph $9.30. NYO-8071

A theoretical and experimental study of optical fibers, by R. J. Potter. University of Rochester, Institute of Optics, Rochester, N. Y. Apr 60. Contracts AT(30-1)-875 and AF 33(616)-6171. 116p. Order from LC. Mi $7.20, ph $22.80. NYO-9033

Conical refractions in crystal optics and hydromagnetics, by D. Ludwig. New York University, Atomic Energy Commission Computing and Applied Mathematics Center, New York, N. Y. Apr 60. Contract AT(30-1)-1480. 23p. Order from LC. Mi $2.70, ph $4.80. NYO-9084

On the kinetic theory of steady gas flow, by L. Sirovich. New York University, Institute of Mathematical Sciences, New York, N. Y. June 60. Contract AT(30-1)-1480. 75p. Order from LC. Mi $4.50, ph $12.30. NYO-9086

The p-n cross sections on Ti^{47}, V^{51}, Cr^{52}, Co^{59} and Cu^{63} from 4 to 615 Mev, by H. Taketani and W. P. Alford. University of Rochester, New York, N. Y. June 60. Contract AT(30-1)-875. 17p. Order from LC. Mi $2.40, ph $3.30. NYO-9087

Metastable states of hyperfragments and the anomalous magnetic moment of the Λ-hyperon, by S. Iwao. University of Rochester, Rochester, N. Y. June 60. Contract AT(30-1)-875. 9p. Order from LC. Mi $1.80, ph $1.80. NYO-9088

Pseudoscalar interaction in nuclear beta decay. Thesis, by C. P. Bhalla. Oak Ridge National Laboratory, Oak Ridge, Tenn. July 60. Contract W-7405-eng-26. 188p. Order from LC. Mi $8.40, ph $28.80. ORNL-2950

Neutron activation cross-sections with 14.8 Mev neutrons in the region of the 28-proton closed shell and (n, He^3) reactions with medium weight nuclei. Thesis, by I. L. Preiss. University of Arkansas, Fayetteville, Ark. Jan 60. Contract AT(40-1)-277. 81p. Order from LC. Mi $4.80, ph $13.80. ORO-235

Ionization and charge transfer cross sections. Technical status report no. 2, covering period December 1, 1959 to February 29, 1960, by E. W. McDaniel and others. Georgia Institute of Technology, Engineering Experiment Station, Atlanta, Ga. 1960. Contract AT(40-1)-2591. 9p. Order from LC. Mi $1.80, ph $1.80. ORO-253

Single-particle excitations of a degenerate electron gas. Technical report no. 161, by A. J. Glick and R. A. Ferrell. University of Maryland, College Park, Md. Dec 59. Contracts AT (40-1)-2098 and Nonr-1797(00). 35p. Order from LC. Mi $3.00, ph $6.30. ORO-270

Multi-group analysis of nuclear reactors in three space dimensions, by F. B. Banan and others. General Electric Company, Knolls Atomic Power Laboratory, Schenectady, N. Y. and Flight Propulsion Laboratory Department, Evendale, Ohio. Apri 60. 167p. Order from OTS. $3.00. R59FPD936

The probability of coverage of point or spherical targets by an effect sphere. Sandia Corporation Albuquerque, N. Mex. June 53. 13p. Order from LC. Mi $2.40, ph $3.30. SC-2925(TR)

The electrical behavior of exploding wires. Part I: Experimental apparatus and techniques, by F. W. Neilson and I. D. McKinney. Sandia Corporation, Albuquerque, N. Mex. Feb 60. 75p. Order from OTS. $2.00. SCTM-8-60(51)

Notes on minimum energy trajectories, by D. R. Morrison. Sandia Corporation, Albuquerque, N. Mex. Jan 56. 7p. Order from LC. Mi $1.80, ph $1.80. SCTM-12-56(51)

Certain nonlinear flows of magnetohydrodynamics, by O. G. Owens. Sandia Corporation, Albuquerque, N. Mex. Feb 56. Contract AT(29-1)-789. 18p. Order from LC. Mi $2.40, ph $3.30. SCTM-19-56(51)

On a nonlinear differential equation arising in magneto-hydrodynamics, by S. Bell. Sandia Corporation, Albuquerque, N. Mex. Feb 56. 16p. Order from LC. Mi $2.40, ph $3.30. SCTM-22-56(51)

Power requirements for sustaining vibrations. Part II, by D. M. Ellett. Sandia Corporation, Albuquerque, N. Mex. Mar 54. Changed from OFFICIAL USE ONLY October 30, 1959. 21p. Order from LC. Mi $2.40, ph $3.30. SCTM-29-54(51)

A class of casualty functions with special applications to circular targets, by D. Young and others. Sandia Corporation, Albuquerque, N. Mex. Aug 54. 21p. Order from OTS. $1.25. SCTM-32-54(51)

Determination of required component reliability from system reliability requirements, by A. M. Breipohl. Sandia Corporation, Albuquerque, N. Mex. Mar 60. 71p. Order from LC. Mi $3.90, ph $10.80. SCTM-63-60(14)

Approximate solution of the free space antenna equation based on a determination of the complex coefficients of the leading components of the current, by C. W. Harrison, Jr. Sandia Corporation Albuquerque, N. Mex. Feb 60. 12p. Order from LC. Mi $2.40, ph $3.30. SCTM-53-60(14)

Report on microwave propagation characteristics of U 12E tunnel, Nevada test site, Mercury, Nevada, by J. F. Barham and S. A. Ingham. Sandia Corporation, Albuquerque, N. Mex. Nov 59. 40p. Order from LC. Mi $3.00, ph $6.30. SCTM-94-59(81)

Explicit symmetric flows of hydromagnetics, by O. G. Owens. Sandia Corporation, Albuquerque, N. Mex. June 56. 5p. Order from LC. Mi $1.80, ph $1.80. SCTM-136-56(51)

Note on the numerical evaluation of integrals of the form $\int_{-\infty}^{\infty} f(x)\phi(x)\,dx$, with particular reference to the determination of the expectation of a function of a normally distributed random variable. Sandia Corporation, Albuquerque, N. Mex. Sep 53. 7p. Order from OTS. 75 cents. SCTM-145-53(51)

Power requirements for space communications, by R. J. Thompson. Sandia Corporation, Albuquerque, N. Mex. July 60. 27p. Order from OTS. 75 cents. SCTM-179-60(51)

An aid to printed circuit layouts using the IBM-704 computer, by S. D. Stearns and R. A. O'Connell. Sandia Corporation, Albuquerque, N. Mex. June 60. 12p. Order from OTS. 50 cents. SCTM-201-60(24)

Waveform effects in shock testing, by W. J. Sieger. Sandia Corporation, Albuquerque, N. Mex. Aug 60. 24p. Order from OTS. 75 cents. SCTM-205-60(12)

Solution of the integral equation which determines radar-cross-section for a scattering ground, by R. A. Hessemer, Jr. and C. S. Williams, Jr. Sandia Corporation, Albuquerque, N. Mex. Sep 54. 12p. Order from LC. Mi $2.40, ph $3.30. SCTM-207-54(54)

High-speed sequential gate control circuitry, by L. Ehrman. Sandia Corporation, Albuquerque, N. Mex. July 60. 10p. Order from OTS. 50 cents. SCTM-239-60(14)

A photographic study of sources of spherical shock waves, by J. Todd, Jr. Sandia Corporation, Albuquerque, N. Mex. Nov 54. 8p. Order from from LC. Mi $1.80, ph $1.80. SCTM-242-54(51)

Vapor pressures of the rare earths, by L. C. Beavis. Sandia Corporation, Albuquerque, N. Mex. Aug 60. 14p. Order from OTS. 50 cents. SCTM-256-60(14)

Characteristics of a free supersonic helium jet issuing normally from a flat plate, by A. Bedford. Sandia Corporation, Albuquerque, N. Mex. Aug 60. 48p. Order from OTS. $1.50. SCTM-281-60(51)

A digital comparator, by N. A. Bourgeois, Jr. Sandia Corporation, Albuquerque, N. Mex. Sep 60. 8p. Order from OTS. 50 cents. SCTM-303-60(14)

Elementary theory of an RF probe in an ionized medium, by C. W. Harrison, Jr., and D. H. Denton, Jr. Sandia Corporation, Albuquerque, N. Mex. Oct 59. 9p. Order from LC. Mi $1.80, ph $1.80. SCTM-309-59(14)

Output format considerations for digital automatic data recording, by E. C. Dowling. Sandia Corporation, Albuquerque, N. Mex. Feb 60. 55p. Order from LC. Mi $3.60, ph $9.30. SCTM-314-59(15)

A design of a mercury-wetted coaxial switch, by T. V. Harroun. Sandia Corporation, Albuquerque, N. Mex. Nov 60. 8p. Order from OTS. 50 cents. SCTM-339-60(14)

Note on linear electro-optic effects and a possible application to shock wave diagnostics, by H. G. Baerwald. Sandia Corporation, Albuquerque, N. Mex. Nov 59. Contract AT(29-1)-789. 14p. Order from LC. Mi $2.40, ph $3.30. SCTM-341-59(51)

Attributes sampling plans for assuring high lot reliability, by B. E. Baker. Sandia Corporation, Albuquerque, N. Mex. Dec 58. Contract AT (29-1)-789. 33p. Order from LC. Mi $3.00, ph $6.30. SCTM-352-58(51)

Cylindrical antenna theory, by R. H. Duncan and F. A. Hinchey. New Mexico State University, Physical Science Laboratory, University Park, N. Mex. July 59. 105p. Order from LC. Mi $5.70, ph $16.80. SCTM-367-59(14)

Basic radiation studies. Quarterly progress report no. 1 for the period from November 1, 1959 through January 31, 1960. Johnston (William H.) Laboratories, Inc., Baltimore, Md. 1960. Contract AT(11-1)-650. 7p. Order from LC. Mi $1.80, ph $1.80. TID-5612

Interactions of fast μ-mesons in lead with small energy transfer. Technical report no. 5, by J. dePagter and R. D. Sard. Washington University, St. Louis, Mo. Jan 60. Contract NONR-816. 48p. Order from LC. Mi $3.30, ph $7.80. TID-5642

Soft x-ray spectra of metals and alloys. Final report for the period July 1, 1951--June 30, 1959, by C. H. Shaw and E. L. Jossem. Ohio State University, Research Foundation, Columbus, Ohio. Dec 59. Contract AT(11-1)-191. 64p. Order from LC. Mi $3.90, ph $10.80. TID-5643

Initial experiments on pressure drop for flow through eccentric annuli. Technical note IX TN-1-59. Parts I and II, by T. Diskind and others. Nov 59. Contract AT(30-3)-187. 44p. Order from LC. Mi $3.30, ph $7.80. TID-5670

Stripping effects in the reactions $C^{12}(He^3, p)N^{14}$ and $C^{12}(He^3, d)N^{13}$ at 13.9 Mev. by J. R. Priest and others. Purdue University, Lafayette, Ind. 1960. Contract AT(11-1)-122. 32p. Order from LC. Mi $3.00, ph $6.30. TID-5700

Magnetic compressional heating and cup confinement of a plasma, by G. Schmidt and others. Stevens Institute of Technology, Hoboken, N. J. 1959. 16p. Order from LC. Mi $2.40, ph $3.30. TID-5701

Angular distributions for $C^{12}(\alpha, p)N^{15}$ at 16.1-19-0 Mev and $F^{19}(\alpha, p)Ne^{22}$ at 18.9 Mev, by J. R. Priest and others. Purdue University, Lafayette, Ind. 1960. Contract AT(11-1)-122. 26p. Order from LC. Mi $2.70, ph $4.80. TID-5707

Final report of researches under contract N5ori-07806 and Nonr-1841(16). Summary of work sponsored by ONR and AEC for period April 1, 1946 to May 15, 1958. Massachusetts Institute of Technology, Laboratory for Nuclear Science, Cambridge, Mass. May 58. 106p. Order from LC. Mi $5.70, ph $16.80. TID-5725

Decay of Si^{26}, by E. L. Robinson and O. E. Johnson. Pudue University, Lafayette, Ind. 1960. Contract AT(11-1)-122. 33p. Order from LC. Mi $3.00, ph $6.30. TID-5732

Separate carry storage adders. Report no. 97, by S. Takahashi. University of Illinois, Digital Computer Laboratory, Urbana, Ill. Mar 60. Contract AT(11-1)-45. 13p. Order from LC. Mi $2.40, ph $3.30. TID-5739

Research and investigation leading to methods of generating and detecting radiation in the 100 to 1000 micron wavelength range of the spectrum. Quarterly progress report no. 16 for period covered December 1, 1959 to March 1, 1960, by P. D. Coleman and others. University of Illinois, Electrical Engineering Research Laboratories, Urbana, Ill. Apr 60. Contract AT(11-1)-392. 90p. Order from LC. Mi $4.80, ph $13.80. TID-5821

Plasma turbulence, by L. S. G. Kovasznay. Space Technology Laboratories, Inc., Physical Research Laboratory, Los Angeles, Calif. Feb 60. Contract AT(04-3)-321. 23p. Order from LC. Mi $2.70, ph $4.80. TID-5825

An experimental study of close collisions of high energy Mu-mesons with electrons, by R. F. Deery. University of Washington, Seattle, Wash. Apr 60. Contract Nonr-477(12). 99p. Order from LC. Mi $5.40, ph $15.30. TID-5848

On the leptonic and non-leptonic decay-modes of k-meson. Technical report no. 171, by J. C. Pati. and others. University of Maryland, College Park, Md. and Wisconsin University, Madison, Wis. Apr 60. Contracts AF49(638)-24 and AT (11-1)-30, AFOSR-TN-60-455. 37p. Order from LC. Mi $3.00, ph $6.30.
TID-5887 (TN-60-455)

Bending of a thin cylindrical shell subjected to a line load around a circumference, by H. R. Merk. Pratt and Whitney Aircraft Division, United Aircraft Corporation, Connecticut Aircraft Nuclear Engine Laboratory, Middletown, Conn. June 59. Contract AT(11-1)-229. 25p. Order from LC. Mi $2.70, ph $4.80. TID-5904

A boundary layer analysis of the kinetics of reaction on a flat plate. Interim report, by J. F. Wehner. Johns Hopkins University, Baltimore, Md. May 60. Contract AT(30-1)-2334. 10p. Order from LC. Mi $1.80, ph $1.80. TID-5916

F-center growth in KCl, by P. V. Carnegie Institute of Technology, Pittsburgh, Pa. Jan 60. Contract AT(30-1)-1828. 103p. Order from LC. Mi $5.70, ph $16.80. TID-5932

Technical progress report. Part I. High-speed computer program. Part II. Circuit research program. Part III. Mathematical methods. Part IV. Illiac use and operation. Part V. IBM 650 use and operation. Part VI. General laboratory information. University of Illinois, Digital Computer Laboratory, Urbana, Ill. Dec 59. Contract AT(11-1)-415. 39p. Order from LC. Mi $3.00, ph $6.30. TID-5973

Technical progress report. Part I. High-speed computer program. Part II. Circuit research program. Part III. Mathematical methods. Part IV. Illiac use and operation. Part VI. General laboratory information. University of Illinois, Digital Computer Laboratory, Urbana, Ill. Jan 60. Contract AT(11-1)-415. 43p. Order from LC. Mi $3.30, ph $7.80.
TID-5974

Technical progress report. Part I. High-speed computer program. Part II. Circuit research program. Part III. Mathematical methods. Part IV. Illiac use and operation. Part V. IBM 650 use and operation. Part VI. General laboratory information. University of Illinois, Digital Computer Laboratory, Urbana, Ill. Feb 60. Contract AT(11-1)-415. 36p. Order from LC. Mi $3.00, ph $6.30. TID-5978

Basic studies in heat transfer and fluid flow. Quarterly progress report for period April 1, 1960 to June 30, 1960, by T. Diskind and others. Columbia University, Department of Chemical Engineering, Engineering Research Laboratories, New York, N. Y. 1960. Contract AT(30-3)-187. 88p. Order from OTS. $2.00.
TID-6035

The effects of intense gamma irradiation on electric breakdown in helium. Final report, by H. C. Shaw. Tracerlab, Inc., Richmond, Calif. Mar 60. 27p. Order from OTS. 75 cents.
TID-6234 (Rev.)

Tritium production. Dependence of purity on neutron flux, by C. M. Van Atta. University of California, Radiation Laboratory, Berkeley, Calif. Nov 50. Decl. March 24, 1960. 10p. Order from LC. Mi $1.80, ph $1.80.
UCRL-1026

Thermal conductivity of metal interfaces, by R. A. Heckman. University of California, Radiation Laboratory, Berkeley, Calif. Nov 50. Contract W-7405-eng-48. 14p. Order from LC. Mi $2.40, ph $3.30. UCRL-1052

ARC research progress report: Mirror machine program, by R. F. Post. University of California, Radiation Laboratory, Livermore, Calif. Oct 56. Decl. October 20, 1958. 30p. Order from LC. Mi $2.70, ph $4.80. UCRL-4795

Pyrotron high-energy experiments, by C. C. Damm and F. S. Eby. University of California, Radiation Laboratory, Livermore, Calif. Apr 58. Contract W-7405-eng-48. 5p. Order from LC. Mi $1.80, ph $1.80. UCRL-5046

Circuit dynamics of the pinch, by J. Killeen and B. A. Lippmann. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Feb 60. Contract W-7405-eng-48. 26p. Order from LC. Mi $3.00, ph $6.30. UCRL-5424-T

The satellite code: A numerical satellite integration program for the IBM 704, by V. S. Smith and others. University of California, Lawrence Radiation Laboratory, Livermore, Calif. June 59. Contract W-7405-eng-48. 46p. Order from LC. Mi $3.30, ph $7.80. UCRL-5462

Electronic engineering design problems in fusion research, by V. L. Smith. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Aug 59. Contract W-7405-eng-48. 32p. Order from LC. Mi $3.00, ph $6.30.
UCRL-5559

Toy top plasma injector, by F. Coensgen and others. University of California, Lawrence Radiation Laboratory, Berkeley, Calif. May 59. 5p. Order from LC. Mi $1.80, ph $1.80. UCRL-5603-T

Some aspects of high temperature plasma research with the mirror machine, by R. F. Post. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Jan 60. Contract W-7405-eng-48. 29p. Order from LC. Mi $2.70, ph $4.80. UCRL-5604-T

Electron-population analysis and the dipole moment of the LiH $^1\Sigma^+$ excited state, by A. M. Karo. University of California, Lawrence Radiation Laboratory, Livermore, Calif. July 59. Contract W-7405-eng-48. 21p. Order from LC. Mi $2.70, ph $4.80. UCRL-5628

Air core cryogenic magnet coils for fusion research and high energy nuclear physics applications, by R. F. Post and C. E. Taylor. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Oct 59. 31p. Order from LC. Mi $3.00, ph $6.30. UCRL-5630-T

Convergence of the quasi-chemical method for the ising square lattice, by S. G. Brush. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Jan 60. Contract W-7405-eng-48. 6p. Order from LC. Mi $1.80, ph $1.80. UCRL-5842-T

Thermodynamic functions of a partially degenerate fully ionized gas, by H. E. DeWitt. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Aug 59. Contract W-7405-eng-48. 56p. Order from LC. Mi $3.60, ph $9.30. UCRL-5652

9-ZOOM--A one-dimensional, multigroup, neutron diffusion theory reactor code for the IBM 709. Part I. Theory and equations. Part II. Input and operating instructions. Part III. Test problem, by S. P. Stone and others. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Aug 59. Contract W-7405-eng-48. 55p. Order from LC. Mi $3.60, ph $9.30. UCRL-5682

Some important parameters of the plasma diode, by R. Fox. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Nov 59. Contract W-7405-eng-48. 30p. Order from LC. Mi $2.70, ph $4.80. UCRL-5683

The high-energy electrostatic plasma gun, by R. Fox. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Nov 59. Contract W-7405-eng-48. Nov 59. 45p. Order from LC. Mi $3.30, ph $7.80. UCRL-5689

Ionization equilibrium equation of state. Part I. Solution of equations, by C. A. Rouse. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Oct 59. Contract W-7405-eng-48. 11p. Order from LC. Mi $2.40, ph $3.30. UCRL-5695-T

Physics of the ion thrust system, by R. Fox. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Oct 59. Contract W-7405-eng-48. 19p. Order from LC. Mi $2.40, ph $3.30. UCRL-5707-T

The bumpy torus, by G. Gibson and others. University of California, Lawrence Radition Laboratory, Livermore, Calif. Oct 59. Contract W-7405-eng-48. 10p. Order from LC. Mi $1.80, ph $1.80. UCRL-5738

Injection and trapping of high current electron beams, by N. C. Christofilos. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Jan 60. 4p. Order from LC. Mi $1.80, ph $1.80. UCRL-5743-T

Gamma rays from inelastic scattering of 14-Mev neutrons on Pb^{203}, by E. Hallett and R. Jensen. University of California, Lawrence Radition Laboratory, Livermore, Calif. Aug 59. Contract W-7405-eng-48. 21p. Order from LC. Mi $2.70, ph $4.80. UCRL-5768

Polarization in pion-nucleon scattering and the second and third pion-nucleon resonances, by M. J. Moravcsik. University of California. Lawrence Radiation Laboratory, Livermore, Calif. Jan 60. Contract W-7405-eng-48. 16p. Order from LC. Mi $2.40, ph $3.30. UCRL-5831-T

Resonance absorption of neutrons in thick sheets of molybdenum, by E. Goldberg and F. A. Kloverstrom. University of California, Lawrence Radiation Laboratory, Livermore, Calif. 1959. 3p. Order from LC. Mi $1.80, ph $1.80. UCRL-5864-T

A plasma cyclotron, by H. P. Furth. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Apr 60. 6p. Order from LC. Mi $1.80, ph $1.80. UCRL-5911-T

Neutron diffusion theory programs and their application to simple critical systems, by S. P. Stone

and R. E. Lingenfelter. University of California, Lawrence Radiation Laboratory, Livermore, Calif. May 60. Contract W-7405-eng-48. 35p. Order from LC. Mi $3.00, ph $6.30.
UCRL-5913

State of matter at high pressure, by B. J. Alder. University of California, Lawrence Radiation Laboratory, Livermore, Calif. May 60. Contract W-7405-eng-48. 24p. Order from LC. Mi $2.70, $4.80. UCRL-5937-T

On the establishment of a temperature function, by W. Aron and L. Parker. University of California. Lawrence Radiation Laboratory, Livermore, Calif. 1960. Contract W-7405-eng-48. 9p. Order from LC. Mi $1.80, ph $1.80.
UCRL-5961-T

Measurement of average neutron energies for (α, n) neutron sources, by W. N. Hess and A. R. Smith. University of California, Lawrence Radiation Laboratory, Berkeley, Calif. Apr 59. Contract W-7405-eng-48. 17p. Order from LC. Mi $2.40, ph $3.30. UCRL-8617

Experiment on double scattering of antiprotons in hydrogen. Talk given at Research Progress Meeting on August 11, 1960, by B. C. Maglic. University of California. Lawrence Radiation Laboratory, Berkeley, Calif. Aug 60. Contract W-7405-eng-48. 17p. Order from OTS. 50 cents. UCRL-9336

On the double spherical harmonics approximation, by P. H. Wackman. Westinghouse Electric Corporation, Bettis Plant, Pittsburgh, Pa. June 58. 18p. Order from LC. Mi $2.40, ph $3.30.
WAPD-PWR-Ph-293

On a numerical approximation to the solution of the one-dimensional, one-velocity transport equation with isotropic scattering. Thesis, by L. A. Hageman. Westinghouse Electric Corporation, Bettis Plant, Pittsburgh, Pa. Jan 59. 54p. Order from LC. Mi $3.60, ph $9.30. WAPD-T-706

Fast neutron penetration through reactor shields, by N. Hartmann and G. R. Hopkins. Westinghouse Electric Corporation, Bettis Plant, Pittsburgh, Pa. June 59. 27p. Order from LC. Mi $2.70, ph $4.80. WAPD-T-783

PDQ-3 A program for the solution of the neutron-diffusion equations in two dimensions on the IBM-704, by W. R. Cadwell. Westinghouse Electric Corporation, Bettis Atomic Power Laboratory, Pittsburgh, Pa. May 60. Contract AT-11-1-GEN-14. 56p. Order from OTS. $1.75.
WAPD-TM-179

ECESS: An IBM-704 program computing transport equation coefficients for a monatomic gas moderator in the thermal energy region, by W. W. Clendenin and G. R. Culpepper. Westinghouse Electric Corporation, Bettis Atomic Power Laboratory, Pittsburgh, Pa. Apr 60. Contract AT-11-1-GEN-14. 33p. Order from OTS. $1.25.
WAPD-TM-200

ART-04 - A modification of the ART program for the treatment of reactor thermal transients on the IBM-704, by J. E. Meyer and W. D. Peterson. Westinghouse Electric Corporation, Bettis Atomic Power Laboratory, Pittsburgh, Pa. July 60. Contract AT-11-1-GEN-14. 49p. Order from OTS. $1.50. WAPD-TM-202

TRIP-1 - A two-dimensional P-3 program in X-Y geometry for the IBM-704, by E. Gelbard and others. Westinghouse Electric Corporation, Bettis Atomic Power Laboratory, Pittsburgh, Pa. July 60. Contract AT-11-1-GEN-14. 21p. Order from OTS. 75 cents. WAPD-TM-217

54 group library for P-1 programs, by A. F. Henry. Westinghouse Electric Corporation, Bettis Atomic Power Laboratory, Pittsburgh, Pa. Apr 60. Contract AT-11-1-GEN-14. 118p. Order from OTS. $1.25. WAPD-TM-224

Mechanism of void formation test facility, by A. J. Martenson and others. Westinghouse Electric Corporation, Bettis Plant, Pittsburgh, Pa. Aug 59. Contract AT-11-1-GEN-14. 28p. Order from LC. Mi $3.00, ph $6.30.
WAPD-V(FBE)-274

Report to the AEC nuclear cross sections advisory group, Argonne National Laboratory, September 19-21, 1960, by J. A. Harvey. Oak Ridge National Laboratory, Oak Ridge, Tenn. Sep 60. 82p. Order from OTS. $2.00. WASH-1029

Dust density versus time and distance in the shock wave, by M. G. Gordon and others. Chemical Warfare Laboratories, Army Chemical Center, Md. June 57. Decl. Sep 59. 52p. Order from LC. Mi $3.30, ph $7.80. WT-1113

Radiation Effects on Materials

Irradiation testing of Enrico Fermi prototype fuel pins in the CP-5, 1957-1959, by M. A. Silliman. and others. Atomic Power Development Associates, Inc., Detroit, Mich. Apr 60. 56p. Order from LC. Mi $3.60, ph $9.30. APDA-130

Calculations for irradiation of natural UO_2-ThO_2 (Revised), by J. W. Ullmann. Oak Ridge National Laboratory, Oak Ridge, Tenn. June 59. 6p. Order from LC. Mi $1.80, ph $1.80. CF-59-6-35

Irradiation effects on UC_2 dispersed in graphite. (ORNL-MTR-48-1), interim report no. 1, by J. G. Morgan and M. F. Osborne. Oak Ridge National Laboratory, Oak Ridge, Tenn. Aug 60. 13p. Order from LC. Mi $2.40, ph $3.30. CF-60-6-78

Irradiation of 63S aluminum samples, by P. D. Wright. Hanford Works, Richland, Wash. Aug 52. Decl. May 5, 1960. 10p. Order from LC. Mi $1.80, ph $1.80. HW-25412

Summary of HAPO research and development program on ceramic fuel materials, by M. J. Sanderson. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Dec 55. Decl. May 6, 1960. Contract W-31-109-Eng-52. 4p. Order from LC. Mi $1.80, ph $1.80. HW-40288

Examination of irradiated uranium-magnesium matrix fuel material. Interim report no. 2, by W. S. Kelly. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. May 56. Decl. May 4, 1960. Contract W-31-109-Eng-52. 4p. Order from LC. Mi $1.80, ph $1.80. HW-42652

Organic recirculating apparatus 2. ORA-2 operating history, September 1956-March 1957, by C. L. Buckner. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. June 57. Decl. February 25, 1960. 13p. Order from LC. Mi $2.40, ph $3.30. HW-50660

Summary of testing for the ELMO-7 test loop, January 1, to December 31, 1958, by D. R. Doman. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Jan 59. Contract AT(45-1)-1350. 27p. Order from LC. Mi $2.70, ph $4.80. HW-57883

Effect of reactor irradiation on Johns-Manville thermal insulation, by C. Mannal. Knolls Atomic Power Laboratory, Schenectady, N. Y. Jan 54. Decl. March 7, 1960. Contract W-31-109-Eng-52. 15p. Order from LC. Mi $2.40, ph $3.30. KAPL-M-CM-35

Radiation damage to non-metallic materials. A literature survey, by E. M. Doss. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. May 57. 16p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-1890

Irradiation damage in metals fuels: A literature survey, by G. Bentle. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Oct 57. Decl. June 60. 20p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-2156

Production of fission gas in U-10 w/o moly fuel rods, by R. H. Davidson. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Apr 59. 5p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-3657

Transient heating of UC fuel elements in the KEWB facility, by E. L. Gardner and S. G. Barnes. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Sep 59. 22p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-4333

Effects of radiation on massive uranium monocarbide, by H. Pearlman. Atomics International Division of North American Aviation, Inc., Canoga Park, Calif. Dec 59. Contract AT-11-1-GEN-8. 16p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-4631

Data package, experiment AI-4, UO_2 ratcheting, by B. M. Watson. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Dec 59. 42p. Order from LC. Mi $3.30, ph $7.80. NAA-SR-Memo-4782

Investigations in irradiated vitreous silica. Period covered: March 2, 1959-March 1, 1960, by H. A. Szymanski and D. Keiffer. Included is a paper 1: Color centers in aluminum oxide, by H. A. Szymanski, and others. Canisius College, Buffalo, N. Y. Mar 60. Contract AT(30-1)-1810. 26p. Order from LC. Mi $2.70, ph $4.80. NYO-7396

Neutron irradiation effects on minority carrier lifetime in silicon diodes, by B. Wickesberg. Sandia Corporation, Albuquerque, N. Mex. Feb 60. 15p. Order from LC. Mi $2.40, ph $3.30. SCTM-56-60(51)

Radiation tolerance of a selected group of coaxial cables, phases I, II, and III, by P. F. Proulx and others. Sandia Corporation, Albuquerque, N. Mex. Jan 60. 37p. Order from LC. Mi $3.00, ph $6.30. SCTM-400-59(16)

Progress report on equipment loan contract AT(30-1)-1919, Mods. 1 and 2. Columbia University, New York, N.Y. [1959]. 19p. Order from LC. Mi $2.40, ph $3.30. TID-5641

Radiation damage studies using the techniques of electron-spin paramagnetic resonsance. Annual progress report for May 1. 1959 through April 30, 1960, by P. J. Bray and A. O. Williams, Jr. Brown University, Providence, R. I. Mar 60. Contract AT(30-1)-2024. 20p. Order from LC. Mi $2.40, ph $3.30. TID-5644

The effect of gamma radiation on simulated lubricating systems and components. Final report, by G. C. Lawrason. Southwest Research Institute San Anantonio, Tex. July 59. 33p. Order from LC. Mi $3.00, ph $6.30. TID-5659

Effect of irradiation of solid catalysts. Quarterly progress report no. 2, by H. C. Andersen and P. N. Rylander. Engelhard Industries, Inc., Newark, N. J. Nov 59. Contract AT(30-1)-2402. 25p. Order from LC. Mi $2.70, ph $4.80. TID-5984

Radioactive Waste

Idaho Chemical Processing Plant technical progress report for October to December 1959, by J. R. Huffman and others. Phillips Petroleum Company, Atomic Energy Division, Idaho Falls, Idaho. Aug 60. Contract AT(10-1)-205. 25p. Order from OTS. 50 cents. IDO-14526

Idaho Chemical Processing Plant technical progress report, radioactive waste disposal projects for January - March 1960, by J. R. Huffman and others. Phillips Petroleum Company, Atomic Energy Division, Idaho Falls, Idaho, Aug 60. Contract AT(10-1)-205. 29p. Order from OTS. 50 cents. IDO-14530

Stainless steel process wastes: I. Removal of alloy metals from waste solutions by mercury cathode electrolysis, by M. E. McLain and D. W. Rhodes. Phillips Petroleum Company, Atomic Energy Division, Idahol Falls, Idaho. Sep 60. Contract AT(10-1)-205. 12p. Order from OTS. 50 cents. IDO-14533

Cyclotron irradiation of type 347 stainless steel w welds in NaK at elevated temperatures, by A. A. Epp, Jr. and others. North American Aviation, Inc., Atomic Energy Research Department, Downey, Calif. Jan 53. Decl. August 5, 1960. Contract AT-11-1-GEN-8. 45p. Order from OTS. 40 cents. NAA-SR-74(Rev.)

A thermal problem associated with underground storage of radioactive wastes, by J. Crowell and F. L. Parker. Oak Ridge National Laboratory, Oak Ridge, Tenn. [nd]. Contract W-7405-eng-26. 72p. Order from OTS. $2.00. ORNL-3002

Radioactive waste processing and disposal. A literature search, by T. F. Davis. Official of Technical Information Extension, Oak Ridge, Tenn. June 60. 92p. Order from OTS. $2.25. TID-3555

Radioactivity statistics, by A. S. Goldin. National Lead Company, Inc., Winchester Laboratory, Winchester, Mass. Nov 60. Contract AT(49-6)-924. 11p. Order from OTS. 50 cents. WIN-120

Reactors—General

Reactor physics measurements in treat, by F. Kirn and others. Argonne National Laboratory, Argonne, Ill. Oct 60. Contract W-31-109-eng-38. 52p. Order from OTS. $1.25. ANL-6173

The reactor kinetics of the transient reactor test facility (TREAT), by D. Okrent and others. Argonne National Laboratory, Argonne, Ill. Sep 60. Contract W-31-109-eng-38. 65p. Order from OTS. $1.50. ANL-6174

Study of the packed-bed fuel element concept, by M. B. Rodin and others. Argonne National Laboratory, Argonne, Ill. Aug 60. Contract W-31-109-eng-38. 55p. Order from OTS. $1.25. ANL-6193

Reactor development program progress report, by N. Hilberry and others. Argonne National Laboratory, Argonne, Ill. Aug 60. Contract W-31-109-eng-38. 58p. Order from OTS. 75 cents. ANL-6215

Reactor development program progress report, September 1960, by N. Hilberry and others. Argonne National Laboratory, Argonne, Ill. Oct 60. Contract W-31-109-eng-38. 72p. Order from OTS. $1.75. ANL-6234

Reactor development program progress report for November, 1960, by N. Hilberry and others Argonne National Laboratory, Argonne, Ill. Dec 60. Contract W-31-109-eng-38. 63p. Order from OTS. $1.75. ANL-6269

Control rod theories evaluation based upon measurements of control rod worths in SM-1-2 reactor assemblies, by J. W. Zwick. General Electric Company, Aircraft Nuclear Propulsion Department, Cincinnati, Ohio. Apr 59. Contracts AT(11-1)-171 and AF33(600)-38062. 40p. Order from OTS. $1.00. APEX-578

A 200-Mw (e) boiler-superheater reactor preliminary design. Preliminary reference design for the AEC program on nuclear superheat development. Prepared by General Nuclear Engineering Crrporation, Dunedin, Fla. and Combustion Engineering, Inc., Windsor, Conn. Oct 60. Contract AT(11-1)-795. 177p. Order from OTS. $2.75. GNEC-136

Thermal neutron flux measurement at the MTR - ETR site, by C. H. Hogg. Phillips Petroleum Company, Atomic Energy Division, Idaho Operations Office, Idaho Falls, Idaho. Oct 60. Contract AT(10-1)-205. 43p. Order from OTS. 75 cents. IDO-16538

MTR - ETR technical branches quarterly report for January 1 - March 31, 1960, by J. R. Huffman and others. Phillips Petroleum Company, Atomic Energy Division, Idaho Operations Office, Idaho Falls, Idaho. 1960. Contract AT(10-1)-205. 52p. Order from OTS. $1.50. IDO-16633

Spert program review, by W. E. Nyer and S. G. Forbes. Phillips Petroleum Company, Atomic Energy Division, Idaho Operations Office, Idaho Falls, Idaho. Oct 60. Contract AT(10-1)-205. 41p. Order from OTS. $1.00. IDO-16634

Quarterly status report on Turret reactor experiment for period ending August 20, 1960, by University of California, Los Alamos Scientific Laboratory, Los Alamos, N. Mex. Sep 60. Contract W-7405-ENG-36. 70p. Order from OTS. $1.75. LAMS-2469

Comparative study of H_2O and D_2O as moderators for heterogeneous pressurized reactors for production of plutonium and useful power, by E. F. Weisner and others. North American Aviation, Inc., Atomic Energy Research Department, Downey, Calif. May 52. Decl. August 4, 1960. Contract AT-11-1-GEN-8. 40p. Order from OTS. 40 cents. NAA-SR-183

Performance of HNPF prototype free-surface sodium pump, by R. W. Atz. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. June 60. Contract AT(11-1)-GEN-8. 26p. Order from OTS. 50 cents. NAA-SR-4336

Standard operating procedure for the pool critical assembly, by E. B. Johnson. Oak Ridge National Laboratory, Oak Ridge, Tenn. [nd]. Contract W-7405-eng-26. 28p. Order from OTS. 75 cents. ORNL-2449

Sulfex-Thorex and Darex-Thorex processes for the dissolution of consolidated Edison power reactor fuel: Laboratory development, by L. M. Ferris and A. H. Kibbey. Oak Ridge National Laboratory, Chemical Technology Division, Oak Ridge, Tenn. [nd]. Contract W-7405-eng-26. 27p. Order from OTS. 75 cents. ORNL-2934

Critical measurements on near-homogeneous, BeO-moderated, oralloy-fueled systems, by F. A. Kloverstrom and D. E. Kraft. University of California, Lawrance Radiation Laboratory, Livermore, Calif. July 60. Contract W-7405-eng-48. 18p. Order from OTS. 50 cents. UCRL-5369 Pt. 2

Reactors—Power

VMR critical-assembly studies, by R. A. Egen and others. Battelle Memorial Institute, Columbus, Ohio. Dec 60. Contract W-7405-eng-92. 57p. Order from OTS. $1.50. BMI-1482

Preliminary hazards evaluation of the isolated coolant loops in the HWCTR, by L. M. Arnett and others. E. I. du Pont de Nemours & Co. Explosives Department, Atomic Energy Division, Technical Division, Savannah River Laboratory, Aiken, S. C. July 60. Contract AT(07-2)-1. 56p. Order from OTS. $1.25. DP-489

Calculation of reactor transients, by H. D. Brown and D. Randall. E. I. du Pont de Nemours & Co. Explosives Department, Atomic Energy Division, Technical Division, Savannah River, Laboratory, Aiken, S. C. Aug 60. Contract AT(07-2)-1. 50p. Order from OTS. $1.25. DP-490

Heavy water moderated power reactors progress report for July 1960, by R. R. Hood and L. Isakoff. E. I. du Pont de Nemours & Co. Explosives Department, Atomic Energy Division, Technical Division, Wilmington, Del. Oct 60. Contract AT(07-2)-1. 29p. Order from OTS. 75 cents. DP-525

40-MW(E) prototype high-temperature gas-cooled reactor research and development program. Summary report for the period January 1, 1959-December 31, 1959 and quarterly progress

report for the period October 1, 1959-December 31, 1959. General Atomic Division, General Dynamics Corporation, San Diego, Calif. Sep 60. Contract AT904-3)-314. 185p. Order from OTS. $3.00. GA-1235

Fast oxide breeder - stress considerations in fuel rod design, by K. M. Horst. General Electric Company, Atomic Power Equipment Department San Jose, Calif. Mar 60. Contract AT(04-3)-189.PA#10. 31p. Order from OTS. 75 cents. GEAP-3347

Nuclear superheat project second quarterly progress report for October-December 1959. General Electric Company, Atomic Power Equipment Department, San Jose, Calif. Sep 60. Contract AT(04-3)-189. 178p. Order from OTS. $2.75. GEAP-3371

Nuclear superheat project fabrication, irradiation and evaluation of superheat fuel element Sh-1 and Sh-2, by E. A. Lees and others. General Electric Company, Atomic Power Equipment Department, San Jose, Calif. Apr 60. Contract AT(04-3)-189. 33p. Order from OTS. $1.00. GEAP-3387

Nuclear superheat development program. Third quarterly progress report January-March 1960. Combustion Engineering, Inc., Windsor, Conn. and General Nuclear Engineering Corporation, Dunedin, Fla. Sep 60. Contract AT(11-1)-795. 123p. Order from OTS. $2.50. GNEC-131

Los Alamos power reactor experiment No. II, LAPRE II, by R. A. Clark. University of California, Los Alamos Scientific Laboratory, Los Alamos, N. Mex. Apr 60. Contract W-7405-ENG-36. 139p. Order from OTS. $2.50. LA-2465

Quarterly status report of the LASL plasma thermocouple development program for the period ending September 20, 1960. The University of California, Los Alamos Scientific Laboratory, Los Alamos, N. Mex. Oct 60. Contract W-7405-ENG-36. 16p. Order from OTS. 50 cents. LAMS-2473

Liquid fluidized bed reactor experiment. Final report-Task 4.00, by M. R. Scheve. Nuclear Division, Martin Company, Baltimore, Md. Apr 60. Contract AT(30-1)-2460. 136p. Order from OTS. $2.75. MND-LFBR-2337

PM-1 nuclear power plant program 5th quarterly progress report March 1, 1960 to May 31, 1960, by F. Hittman. Martin Company, Nuclear Division, Baltimore, Md. July 60. Contract AT(30-1)-2345. 193p. Order from OTS. $3.00. MND-M-1816

Thermo-physical properties of irradiated polyphenyl coolants. Part I. Density and viscosity, by R. H. J. Gercke and G. Asanovich. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Dec 60. Contract AT(11-1)-GEN-8. 51p. Order from OTS. $1.25. NAA-SR-4484

Study of remote military power applications Byrd Station Antarctica for United States Atomic Energy Commission, New York Operations Office, New York, N. Y. Kaiser Engineers, Division of H. J. Kaiser Company, Oakland, Calif. May 60. (Revised July, 1960). Contract AT(30-1)-2441. 88p. Order from OTS. $2.25. NYO-9052

Study of remote military power applications Pole Station Antarctica for United States Atomic Energy Commission, New York Operations Office, New York, N. Y. Kaiser Engineers, Division of H. J. Kaiser Company, Oakland, Calif. May 60. (Revised July, 1960). Contract AT(30-1)-2441. 95p. Order from OTS. $2.50. NYO-9053

An evaluation of fossil superheat for nuclear power plants, by W. H. Colquhoun and others. EBASCO Services Incorporated, New York, N. Y. Oct 60. Contract AT(30-1)-2524. 297p. Order from OTS. $3.50. NYO-9400

Hydrogenous reactor program quarterly progress report for period ending April 30, 1960, by R. B. Briggs and others. Oak Ridge National Laboratory, Oak Ridge, Tenn. [nd]. Contract W-7405-eng-26. 129p. Order from OTS. $2.75. ORNL-2947

Molten-salt reactor program quarterly progress report for periods ending January 31, and April 30, 1960, by H. G. MacPherson. Oak Ridge National Laboratory, Oak Ridge, Tenn. [nd]. Contract W-7405-eng-26. 88p. Order from OTS. $2.25. ORNL-2973

Gas-cooled reactor project quarterly progress report for period ending September 30, 1960, by Staff Oak Ridge National Laboratory, Oak Ridge, Tenn. [nd]. Contract W-7405-eng-26. 174p. Order from OTS. $2.75. ORNL-3015

Economics of nuclear power. A bibliography of selected literature, by W. E. Bost. Office of Technical Information Extension, Oak Ridge,

Tenn. Jan 60. 82p. Order from OTS. $2.00. TID-3089

Fabrication of Yankee core I prototype fuel element, by M. D'Amore. Westinghouse Electric Corporation, Atomic Power Department, Pittsburgh, Pa. May 60. Contract AT(30-3)-222. 52p. Order from OTS. $1.25. YAEC-144

Semi-annual progress report for the period January 1 to June 30, 1960, by H. E. Walchli. Westinghouse Electric Corporation, Atomic Power Department, Pittsburgh, Pa. Aug 60. Contract AT(30-3)-222. 26p. Order from OTS. 50 cents. YAEC-186

Bettis technical review. Reactor technology, by D. S. Griffin and others. Westinghouse Electric Corporation, Bettis Atomic Power Laboratory, Pittsburgh, Pa. June 60. Contract AT-11-1-GEN-14. 92p. Order from OTS. $2.00. WAPD-BT-19

Technology—Feed Materials

Summary technical report for the period April 1, 1955 to June 30, 1955, by J. W. Simmons. National Lead Company of Ohio, Cincinnati, Ohio. July 55. Decl. June 17, 1960. Contract AT(30-1)-1155. 183p. Order from OTS. $2.75. NLCO-565

Summary technical peport for the period January 1, 1956 to March 31, 1956, by J. W. Simmons. National Lead Company of Ohio, Cincinnati, Ohio. Apr 56. Decl. June 18, 1960. Contract AT(30-1)-1156. 173p. Order from OTS. $1.10. NLCO-625

Summary technical report for the period October 1, 1956 to December 31, 1956, by J. W. Simmons. National Lead Company of Ohio, Cincinnati, Ohio. [1956]. Decl. July 19, 1960. Contract AT(30-1)-1156. 165p. Order from OTS. $1.10. NLCO-660

Summary technical report for the period January 1, 1957 to March 31, 1957, by J. W. Simmons. National Lead Company of Ohio, Cincinnati, Ohio. [1957]. Decl. September 19, 1960. Contract AT(30-1)-1156. 155p. Order from OTS. 85 cents. NLCO-670

Fluorox process: Production of UF_6 in a fluidized bed reactor, by C. D. Scott and others. Oak Ridge National Laboratory, Oak Ridge, Tenn. Oct 60. Contract W-7405-eng-26. 59p. Order from OTS. $1.50. ORNL-2797

SOURCE INDEX

Source	Page	PB Number
Adjutant General's Office, Washington, D.C.	262	152 756
		152 757
Admiral Corp., Chicago, Ill.	288	153 096
Advanced Electronics, General Electric Co., Ithaca, N. Y.	283	153 050
Aero Geo Astro, Corp., Alexandria, Va.	288	152 728
Aero-Space labs., North American Aviation, Inc., Downey, Calif.	257	152 846
AeroChem Research Labs., Inc., Princeton, N. J.	310	148 777
Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.	285	147 554
Aeronautical Accessories Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio	305	171 345
Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.	329	149 655
	330	152 463
Aerospace Medical Div., Wright Air Development Div., Wright-Patterson AFB, Ohio.	260	171 332
	265	171 333
Air Force Cambridge Research Labs., Bedford, Mass.	278	152 684
	278	152 701
	284	153 884
	288	152 984
	288	152 985
	349	152 987
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio	310	153 587
Air Force Missile Development Center, Holloman AFB, N. Mex.	263	152 744
	305	152 743
Air Force Special Weapons Center, Kirtland AFB, N. Mex.	334	152 698
Air Weather Service, Scott AFB, Ill.	279	152 977
American Inst. for Research, Pittsburgh, Pa.	260	149 642
		153 460
Antenna Lab., Ohio State U. Research Foundation, Columbus, Ohio.	283	152 669
Antioch College, Yellow Springs, Ohio	263	171 313
Applied Mathematics and Statistics Labs., Stanford U., Calif.	317	152 883
Arctic Aeromedical Lab., Ladd AFB, Alaska	263	153 325
	265	153 336
	266	153 326
	266	153 328
	266	153 341
	266	153 342
	266	153 351
	266	153 353
	267	152 695
	267	153 338
	267	153 352
	273	153 331
	310	153 339
	313	153 320
	335	153 346
Armour Research Foundation, Chicago, Ill.	336	152 730
	337	152 962
	341	152 731
	348	171 329-1
Army Chemical Research and Development Labs., Army Chemical Center, Md.	271	152 599
	272	149 634
	272	149 635
	306	152 595
	306	152 596
	306	152 597
	339	149 641
Army Signal Research and Development Lab., Fort Monmouth, N. J.	288	153 003
	317	152 674
	317	152 675
	352	152 564
	352	152 565
	352	152 997
Army Snow, Ice and Permafrost Research Establishment, Wilmette, Ill.	281	171 190
Arnold Engineering Development Center, Tullahoma, Tenn.	306	153 058
	325	152 556
	325	152 843
	338	152 664
	348	152 966
ARO, Inc., Tullahoma, Tenn.	306	153 058
	325	152 556
	325	152 843
	338	152 664
	348	152 966
Atlantic Research Corp., Alexandria, Va.	275	153 033
Avco Corp., Nashville, Tenn.	285	152 967
Avco-Everett Research Lab., Mass.	346	152 912
Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.	269	152 470
	269	152 740
Aviation Psychology Lab., U. of Illinois, Urbana	263	152 703
Ballistic Research Labs., Aberdeen Proving Ground, Md.	306	149 633
	306	152 732
	307	152 729
	325	152 602
Battelle-Institut, Frankfurt-am Main (West Germany)	340	149 657
Battelle Memorial Inst., Columbus, Ohio	285	171 344
	329	171 198
	339	171 342
Behavioral Sciences Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio	260	171 332
	263	171 313
	318	171 312
Bell Aircraft Corp., Buffalo, N. Y.	285	171 192
Bell Telephone Labs., Inc., Whippany, N. J.	289	149 722
	289	152 658
	341	149 721
	341	149 723
	342	149 724
Biomedical Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio	273	171 309
	311	171 308
Birmingham U. (Gt. Brit)	289	152 926
Bliley Electric Co., Erie, Pa.	307	152 673
Block Associates, Inc., Cambridge, Mass.	340	152 714-1
	340	152 714-2
Block Associates, Inc., Cambridge, Mass. (con.)	340	152 714-3
	340	152 714-4
	341	152 713
Bolt, Beranek and Newman, Inc., Cambridge, Mass.	326	171 302
	328	152 906
Bonn U. (West Germany)	276	152 770
British Columbia U. (Canada)	274	149 683
Brooke Army Medical Center, Fort Sam Houston, Tex.	271	152 368
Brown U. Div. of Applied Mathematics, Providence, R. I.	327	152 857
	328	152 858
Brown U. Div. of Engineering, Providence, R. I.	346	152 742
Bureau of Naval Weapons, Washington, D. C.	289	171 209
		171 212
		171 213
		171 219
	290	171 205
		171 210
		171 220
		171 221
		171 222
		171 223
	291	171 206
		171 207
		171 211
		171 214
		171 215
		171 217
		171 218
	292	171 200
		171 201
		171 204
		171 208
		171 216
	328	171 203
	336	171 202
Bureau of Ships, Washington, D.C.	289	171 209
		171 212
		171 213
		171 219
	290	171 205
		171 210
		171 220
		171 221
		171 222
		171 223
	291	171 206
		171 207
		171 211
		171 214
		171 215
		171 217
		171 218
	292	171 200
		171 201
		171 204
		171 208
		171 216
	328	171 203
	336	171 202
California Inst. of Tech., Pasadena	328	147 535
California U., Berkeley	282	152 892
		152 893
	318	149 646
		152 606
		152 607
		152 715-1
		152 715-2
	319	152 375
	331	152 916
	336	152 869
California U., Los Angeles	271	153 330
California U., Los Angeles, School of Medicine	270	153 349
	271	153 350
Canterbury U. (New Zealand)	345	147 558
Carnegie Inst. Of Tech., Pittsburgh, Pa.	318	171 334
	337	152 882

Source	Page	PB Number
Catholic U. of America, Washington, D. C.	326	149 686
Center for Radiophysics and Space Research, Cornell U., Ithaca, N.Y.	349	152 523
Central Technical Inst. T.N.O., The Hague (Netherlands)	276	149 675
Chemical Engineering Lab., Princeton U., N. J.	276	153 090
		153 091
Chicago U., Ill.	279	152 905
Clevite Research Center, Cleveland, Ohio	342	149 692
Columbia U. School of Engineering, New York	292	152 254
	319	152 896
	351	152 897
Combustion and Explosives Research, Inc., Pittsburgh, Pa.	314	149 665
Consolidated Electrodynamics Corp., Pasadena, Calif.	315	171 303
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.	326	152 947
Cornell-Dubilier Electric Corp., Indianapolis, Ind.	293	149 703
Cornell U., Ithaca, N.Y.	276	149 681
	279	153 345
Cornell U. Medical Coll., New York	266	153 328
Chrysler Corp., Detroit, Mich.	285	153 624
Curtiss-Wright Corp., Santa Barbara, Calif.	286	171 195
	293	171 194
Danish National Committee of URSI	336	153 279
David Taylor Model Basin, Washington, D. C.	257	153 726
	310	152 734
	328	153 574
Defense Atomic Support Agency, Washington, D.C.	334	153 030
Defense Metals Information Center, Battelle Memorial Inst., Columbus, O.	311	161 227
	313	161 225
	329	161 226
	330	151 097
		161 213
Deutscher Wetterdienst, Hohenpeissenberg (West Germany)	281	152 541
Diamond Ordnance Fuze Labs., Washington, D.C.	293	152 581
		152 655
		152 922
		153 496
	311	171 050
	337	152 923
Directorate of Flight and All-Weather Testing, Wright-Patterson AFB, Ohio	286	153 630
Dublin Inst. for Advanced Studies (Eire)	333	152 768
Dunlap and Associates, Inc., Stamford, Conn.	259	150 317
	260	147 305
Dynamic Simulations Lab., Ordnance Tank-Automotive Command, Center line, Mich.	307	152 845
East Coast Aeronautics, Inc., Pelham Manor, N.Y.	294	153 273
Educational Research Corp., Cambridge, Mass.	261	153 631
Electrical Engineering Research Lab., U. of Illinois, Urbana.	294	149 636
		149 637
		152 486
		152 489
Electrical Engineering Research Lab., U. of Texas, Austin.	283	152 951
Electro-Optical Systems, Inc., Pasadena, Calif.	307	153 100
	342	149 706
Electron Tube and Microwave Lab., Calif. Inst. of Tech., Pasadena	347	152 996
Electron Tube Research Lab., U. of Minnesota, Minneapolis	295	152 735
Electronic Systems Lab., Mass. Inst. of Tech., Cambridge	286	152 885
Electronics Research Lab., U. of California, Berkeley	295	147 314
		152 741
		152 859
		152 861
		152 994
	296	147 313
		152 860
	319	148 500
	338	152 960
Elk Electronic Labs., Inc., New York	296	152 992
Fabric Research Labs., Inc., Dedham, Mass.	314	171 311
Feltman Research Labs., Picatinny Arsenal, Dover, N. J.	315	150 013
	316	149 963
Florida U. Engineering and Industrial Experiment Station, Gainesville	348	152 137
Fluid Dynamics Research Lab., Mass. Inst. of Tech., Cambridge	296	152 603
Foster, John J. Mfg. Co., Costa Mesa, Calif.	286	149 718
Fuels Research Lab., Mass. Inst. of Tech., Cambridge	315	171 306
General Electric Co., Detroit, Mich.	330	171 348
General Electric Co., Schenectady, N. Y.	296	149 694
		152 610
	342	171 340
General Electric Co., Syracuse, N. Y.	297	152 660
		152 958
General Electric Research Lab., Schenectady, N. Y.	330	171 348
	342	152 473
Georgia Inst. of Tech., Engineering Experiment Station, Atlanta	270	153 343
	343	149 695
		149 696
	348	152 789
Gordon McKay Lab. of Applied Science, Harvard U., Cambridge, Mass.	343	149 628
Granger Associates, Palo Alto, Calif.	297	152 671
Harvard U., Cambridge, Mass.	319	152 369
		152 371
		152 375
		152 376
Hawaii Inst. of Geophysics, Honolulu	279	149 668
		152 613
Hermes Electronics Co., Cambridge, Mass.	297	149 708
		149 709
		149 710
Hesse-Eastern Div., Flightex Fabrics, Inc., Cambridge, Mass.	311	153 272
High Altitude Observatory, Boulder, Colo.	258	152 946
Honeywell Research Center, Hopkins, Minn.	343	149 684
		152 891
Hughes Aircraft Co., Culver City, Calif.	263	153 387
Hughes Research Labs., Malibu, Calif.	298	152 841
Human Factors Research, Inc., Los Angeles, Calif.	264	152 888
Human Resources Research Office, George Washington U., Washington, D. C.	261	152 580
		152 788
Human Sciences Research, Inc., Arlington, Va.	334	152 821
Illinois Inst. of Tech., Chicago	324	147 310
Illinois U., Urbana	319	152 972
	329	171 193
	344	152 683
Imperial Coll., London (Gt. Brit.)	280	152 774
		152 775
		153 391
Institut für Animalische Physiologie der J. W. Goethe Universität (West Germany)	267	152 690
Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park	320	149 729
		149 730
	324	152 609
Institute of Andean Biology, Lima (Peru)	267	152 763
Institute of Engineering Research, U. of California, Berkeley	324	148 405
Institute of Geodesy, Photogrammetry and Cartography, Ohio State U. Research Foundation, Columbus	282	152 799
		152 800
Institute of Mathematical Sciences, New York U., N. Y.	320	152 431
	324	149 681
	344	152 725
	349	152 842
Institute of Optics, U. of Rochester, N. Y.	341	149 651
Institute of Research, Lehigh U., Bethlehem, Pa.	330	153 882
Institute of Rubber Research, U. of Akron, Ohio	316	153 172
Institute of Tech., U. of Minnesota, Minneapolis	320	149 644
International Business Machines Corp., Kingston, N.Y.	298	152 672
	323	153 274
Ionosphere Research Lab., Pennsylvania State U., University Park	283	152 697
	284	152 696
	298	152 823
		152 824
Israel Inst. of Tech., Haifa	326	152 479
Istituto di Chimica Fisica dell'Universita, Pavia (Italy)	276	149 678
ITT labs., Fort Wayne, Ind.	352	171 197
J.G. Engineering Research Associates, Baltimore, Md.	336	149 682

Source	Page	PB Number
James Forrestal Research Center, Princeton, N. J.	328	149 689
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena	307	153 885
	311	153 791
Kansas U., Lawrence	271	152 619
	320	152 894
Kearfott Co., Inc., Little Falls, N. J.	307	152 778
Kentucky U., Lexington	276	152 746
Laboratoire de Ferromagnetisme, Institut de Physique, Strasbourg (France)	337	153 277
Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge	298	149 726
	336	149 728
	337	149 725
Laboratory of Statistical Research, U. of Washington, Seattle	320	152 900
Lamont Geological Observatory, Palisades, N. Y.	282	152 908
Leicester U. (Gt. Brit.)	344	152 925
Lincoln Lab., Mass. Inst. of Tech., Lexington	264	152 621
	298	153 095
	299	149 741
		152 409
		152 629
		152 750
		152 948
		152 949
	300	152 721
	308	152 759
	320	152 934
	321	152 723
		153 053
	323	152 722
	344	152 462
		152 932
		152 973
	349	149 740
		152 466
	351	152 787
		152 933
Lockheed Aircraft Corp., Marietta, Ga.	333	153 790
Lockheed Aircraft Corp., Sunnyvale, Calif.	258	171 196
	308	152 939
Lockheed Electronics Co., Metuchen, N. J.	300	152 935
Lowell Technological Inst. Research Foundation, Mass.	308	152 522
Lund U. (Sweden)	276	152 478
McDonnell Aircraft Corp., St. Louis, Mo.	286	149 666
McGill U. (Canada)	280	152 952-1
		152 952-2
Marine Lab., U. of Miami, Coral Gables, Fla.	282	153 625
Maryland U., College Park	258	152 936
	332	149 650
		149 732
		149 733
Massachusetts Inst. of Tech., Cambridge, Mass.	334	152 661
	339	149 639
		149 680
		152 863
	348	150 036
	349	150 035
Massachusetts U., Amherst	275	149 687
	277	149 631
	278	149 638
Material Labs., Puget Sound Naval Shipyard, Bremerton, Wash.	314	152 862
Materials Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio	270	153 573
Materials Research Lab., Watertown Arsenal, Mass.	344	152 854
Mathematics Research Center, U. of Wisconsin, Madison	324	149 756
Melpar, Inc., Falls Church, Va.	300	148 282
Metals and Ceramics Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio	329	171 307
Metals Research Lab., Brown U., Providence, R. I.	345	149 690
Michigan State U., East Lansing	321	149 663
Michigan U., Ann Arbor	347	171 336
Michigan U. Research Inst., Ann Arbor	300	152 995
Microwave Associates, Inc., Burlington, Mass.	300	152 668
Microwave Lab., Stanford U., Calif.	301	152 847
		152 937
		152 938
Microwave Physics Lab., Sylvania Electric Products, Inc., Mountain View, Calif.	347	152 633
Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.	301	152 652
	313	152 724
	338	153 089
	345	149 679
	350	153 088
Minnesota U., Minneapolis	286	171 199
Minnesota U. School of Physics, Minneapolis	258	148 494
		149 645
	259	148 495
Montpellier U. (France)	319	152 972
Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia	323	153 596
		153 597
	324	171 339
Motorola, Inc., Phoenix, Ariz.	350	152 993
Narragansett Marine Lab., U. of Rhode Island, Kingston	283	152 907
National Bureau of Standards Boulder, Colo.	350	151 377-7
National Research Labs., Ottawa (Canada)	277	153 606
	315	153 476
	326	152 529
		153 195
		153 196
Naval Air Test Center, Patuxent River, Md.	301	152 833
Naval Civil Engineering Lab., Port Hueneme, Calif.	313	152 940
		152 942
Naval Engineering Experiment Station, Annapolis, Md.	310	153 793
Naval Ordnance Lab., White Oak, Md.	302	171 353
	308	171 352
	321	171 349
		171 350
		171 351
		171 354
		171 355
	345	149 738
Naval Ordnance Test Station, China Lake, Calif.	280	152 699
		152 700
	308	152 826
	313	153 867
		153 883
Naval Ordnance Test Station, China Lake, Calif. (con.)	315	152 825
	321	171 327
	325	152 632
	337	149 654
	341	149 643
Naval Personnel Research Field Activity, San Diego, Calif.	261	152 626
Naval Postgraduate School, Monterey, Calif.	280	153 063
		153 064
Naval Radiological Defense Lab., San Francisco, Calif.	273	153 589
	274	153 571
	277	153 588
	332	153 071
	333	153 622
	334	153 621
	335	153 068
		153 070
		153 570
Naval Research Lab., Washington, D. C.	277	150 619
	284	150 618
	302	153 576
		153 577
		161 968
	309	171 [illegible]
		171 051
	316	149 850
	324	149 297
	352	171 315
Naval Supersonic Lab., Mass. Inst. of Tech., Cambridge	327	149 344
Naval Weapons Plant, Washington, D. C.	331	149 739
Navy Underwater Sound Reference Lab., Orlando, Fla.	300	152 979
New Mexico State U., University Park	259	152 968
New York State Coll. of Ceramics, Alfred U.	345	152 544
New York U., N. Y.	341	152 624
	345	171 356
New York U. Coll. of Engineering, N. Y.	302	153 004
	303	152 791
		153 035
Nitrogen Div., Allied Chemical Corp., Hopewell, Va.	331	171 301
Norske Meteorologiske Institutt (Norway)	281	152 769
North Carolina State Coll., Raleigh	271	153 332
Northrop Corp., Hawthorne, Calif.	287	171 328
Northwestern U., Evanston, Ill.	331	152 691
	345	171 338
Numerical Analysis Research, U. of California, Los Angeles	322	153 275
Ohio State U. Research Foundation, Columbus	259	152 171
	264	152 913
Oklahoma U. School of Medicine, Oklahoma City	268	153 337
Oxford U. (Gt. Brit.)	350	152 418
Pacific Semiconductors, Inc., Culver City, Calif.	303	152 659
Pennsylvania State U., University Park	325	153 109
Pennsylvania State U. Mineral Industries Experiment Station, University Park	281	152 930
Pennsylvania U., Philadelphia	257	152 834
Perkins Observatory, Delaware, Ohio	259	152 171
Personnel Lab., Wright Air Development Div., Lackland AFB, Texas	261	152 783

Source	Page	PB Number
Personnel Lab., Wright Air Development Div., Lackland AFB, Texas (con.)	262	153 506
		153 572
	264	153 110
Physical Research Lab., Space Tech. Labs., Inc., Los Angeles, Calif.	346	152 901
Physical Science Lab., New Mexico State U., University Park	303	149 647
Physics Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio	277	171 310
	341	171 191
Plasma Propulsion Lab., Republic Aviation Corp., Farmingdale, N. Y.	312	152 749
	347	152 955
Plasmadyne Corp., Santa Ana, Calif.	350	152 929
Plastics Technical Evaluation Center, Arsenal, Dover, N. J.	316	171 034
Polytechnic Inst. of Brooklyn, N. Y.	325	152 779
	327	152 537
	338	152 868
Portland Cement Association, Skokie, Ill.	336	152 730
Princeton U., N. J.	287	152 625
		152 831
	322	149 649
	327	149 677
		152 738
Propulsion Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio	287	153 629
Psychological Lab., U. of Southern California, Los Angeles	264	148 004
Public Health Service, Washington, D. C.	273	161 371-9
Purdue U., Lafayette, Ind.	322	152 761
		152 762
Quartermaster Field Evaluation Agency, Fort Lee, Va.	336	149 688
Queen's U., Belfast (Northern Ireland)	275	153 085
Raytheon Co., Waltham, Mass.	303	149 629
		149 630
	346	152 628
Remington Arms Co., Inc., Bridgeport, Conn.	308	152 839
	309	152 840
Rensselaer Polytechnic Inst., Troy, N. Y.	322	153 389
Republic Aviation Corp., Farmingdale, N. Y.	309	171 337
Rochester U., N. Y.	275	149 664
	277	153 158
Rock Island Arsenal Lab., Ill.	314	171 047
	317	150 961
		171 042
		171 043
	332	171 041
Rocketdyne, Canoga Park, Calif.	312	171 305
Rome Air Development Center, Griffiss AFB, N. Y.	304	161 894-1
Rowland and Co., Haddonfield, N. J.	259	149 211
Royal Holloway Coll., U. of London (Gt. Brit)	275	152 767
	348	152 789
Royal Inst. of Tech. (Sweden)	274	152 772
		152 773
Rutgers State U., New Brunswick N. J.	265	152 889
St. Louis School of Medicine, Mo.	268	152 617
School of Aviation Medicine, Brooks AFB, Tex.	265	152 764
	268	152 460
	273	152 630
Science and Technology Div., Library of Congress, Washington, D. C.	272	171 029
Sheffield U. (Gt. Brit.)	278	149 658
		149 659
Sindel S. p. A., Rome (Italy)	350	152 963
Sonotone Corp., Elmsford, N. Y.	304	149 693
Southern Research Inst., Birmingham, Ala.	275	171 300
Space Sciences Lab., General Electric Co., Philadelphia, Pa.	312	152 959
Spectroscopy Lab., Pennsylvania State U., University Park	339	152 864
Stanford Research Inst., Menlo Park, Calif.	304	152 670
Stockholm U. (Sweden)	265	152 535
Struthers-Dunn, Inc., Pitman, N. J.	309	149 704
Sundstrand Turbo Div., Sundstrand Corp., Pacoima, Calif.	312	152 856-1
		152 856-2
	313	152 856-3
Sylvania Electric Products, Inc., Seneca Falls, N. Y.	304	149 712
Syracuse U., N. Y.	322	152 736
		152 737
	333	171 335
Syracuse U. Research Inst., N. Y.	304	152 986
Technical Research Group, Somerville, Mass.	305	152 776
Technical Research Group, Syosset, N. Y.	335	171 341
	338	152 777
Technische Hochschule, Karlsruhe (West Germany)	268	153 037
Technische Hochschule, Stuttgart (West Germany)	347	153 626
Technische Hogeschool, Delft (Netherlands)	328	149 640
Tennessee U., Knoxville	263	153 271
	265	152 782
Thiokol Chemical Corp., Elkton, Md.	316	153 620
Trans-Tech, Inc., Rockville, Md.	305	153 226
Trinity Coll., Dublin (Eire)	270	152 477
Tufts U. School of Medicine, Boston, Mass.	268	152 618
Tulane U., New Orleans, La.	268	153 575
University of Southern California, Los Angeles	322	148 066
University of Southern California Engineering Center, Los Angeles	327	152 557
University of Southern California School of Medicine, Los Angeles	269	171 304
		171 343
	272	153 348
Upper Air Research Lab., U. of Utah, Salt Lake City	284	152 623
Veterans Administration Hospital, Long Beach, Calif.	271	153 330
Washington U., St. Louis, Mo.	323	152 747
	331	149 736
	332	149 737
	333	152 911
Washington U., Seattle	283	148 426
	314	152 446
Washington U., Seattle. Coll. of Engineering	351	152 981
Washington U., Seattle. Div. of Counseling and Testing Services	323	148 609
Washington U., Seattle. School of Medicine	269	153 344
	270	153 327
Watertown Arsenal Labs., Mass.	309	152 988
		153 062
	330	171 044
Wayne State U., Detroit, Mich.	323	152 436
	346	152 694
	351	149 685
Wenner-Gren Aeronautical Research Lab., Lexington, Ky.	263	152 744
Weather Forecasting Research Center, U. of Chicago, Ill.	281	153 046
Westinghouse Research Labs., Pittsburgh, Pa.	331	152 880
Willow Run Labs., U. of Michigan, Ann Arbor	269	152 605
	305	152 536
Wisconsin U., Madison	274	152 631
Woods Hole Oceanographic Institution, Mass.	281	152 870
Yerkes Observatory, Williams Bay, Wis.	259	153 278

SUBJECT INDEX

Subject	Page	PB Number
Abelian groups		
--Theory	318	152 606
Acceleration		
--Physiological effects	269	171 304
		171 343
Acoustics		
--Applications	336	149 682
Acrylic resins		
--Solvent extraction	316	149 963
--Temperature factors	316	149 850
Aerial photography		
--Antarctic regions	349	152 987
Aerial reconnaissance		
--Psychological factors	264	153 387
Aerial warfare		
--Bibliography	263	153 387
	334	152 821
Aerodynamic data		
--Reduction	325	152 843
--Tables	326	152 479
Aerodynamic heating	327	152 557
Aeroelastic interaction	285	171 192
Aerological sonde	281	152 541
Aerospace	272	171 029
Agard B	325	152 556
Air		
--Purification	309	171 046
		171 051
Air blast		
--Measurement	306	149 633
Aircraft		
--Ice formation	279	152 977
	286	153 630
--Materials	287	171 328
--Stability	285	171 192
--Supersonic characteristics	285	171 192
--Take-off	286	153 630
Airfoils		
--Model test results	325	152 556
--Supersonic characteristics	326	152 479
Airframes		
--Development	285	152 967
--Materials	330	161 213
Airplane panels		
--Flutter	286	171 199
--Sandwich construction	286	149 718
--Supersonic characteristics	286	171 199
Alaskan Indian	266	153 328
Alcohols		
--Chemical effects	276	152 746
--Surface tension	277	150 619
Algebra		
--Theory	317	152 675
	318	152 607
	322	149 649
Alkaline batteries		
--Development	304	149 693
Alloys		
--Temperature factors	330	171 348
--Testing equipment	330	171 348
--USSR	329	171 331
Aluminum		
--Blast effects	314	171 047
Aluminum alloys		
--Casting	330	152 463
--Mechanical properties	287	171 328
	330	152 463
--Metallurgy	329	149 655
Aluminum alloys		
--Stresses	287	171 328
--Temperature factors	287	171 328
Amines		
--Molecular structure	276	152 746
--Oxidation	275	153 085
Ammeters		
--Calibration	290	171 210
Amphibious vehicles		
--Design	313	152 940
Amplifiers		
--Circuits	302	153 576
		153 577
--Design	325	152 843
AN/GGA-2(XW-1)	300	148 282
AN/PPN-13(XE-2)	350	152 993
AN/PRM-14	296	152 992
Analysis of variance	318	171 334
Analytic functions		
--Theory	322	149 649
Analytic spaces	322	149 649
Antenna radiation patterns		
--Mathematical analysis	299	152 949
	305	152 776
--Polarization	288	152 728
--Synthesis	298	152 841
Antennas		
--Impedance	301	152 833
--Mathematical analysis	295	152 861
Anticorrosive paints		
--Test results	314	152 862
Antiferromagnetism	334	152 932
Antipersonnel weapons		
--Effectiveness	271	152 599
Applied psychology	262	152 757
Approximate computation	319	152 375
	320	149 730
		152 894
	322	153 275
Aptitude tests		
--Effectiveness	261	152 626
	262	153 572
--Standards	262	152 756
Aquatic animals		
--Nutrition	283	152 907
Arctic regions		
--Physiological effects	267	153 352
Arctic sleds		
--Design	313	152 942
Argon		
--Spectrographic analysis	338	152 664
Armor plate		
--Test methods	309	153 062
--Vibration	307	152 845
Atmosphere		
--Arctic regions	280	153 063
--Density	284	152 623
--Electromagnetic effects	349	149 740
--Heat transfer	280	153 063
	280	153 064
--Moisture content	284	150 618
--Temperature	280	153 064
Atmospheric refraction		
--Measurement	283	152 951
Atmospheric sounding		
--Instrumentation	283	153 050
Atmospherics	336	153 279
Atomic bomb explosions	334	152 821
Atomic spectra		
--Determination	338	152 664
Atomic structures		
--Mathematical analysis	339	149 639
Atoms		
--Chemical reactions	278	149 659
--Ionization	339	149 639
Attention		
--Physiological factors	264	152 888
Attitudes		
--Measurement	262	153 271
	265	152 782
Automata	324	171 339
Aviation medicine		
--Bibliography	265	171 333
	272	171 029
Aviation personnel		
--Attitudes	262	153 271
	265	152 782
--Classification	261	153 631
	262	153 572
--Performance	262	153 506
--Selection	261	153 631
--Test methods	261	153 631
--Training	260	171 332
B-47	286	153 630
Backward wave amplifiers		
--Development	295	152 994
Bacteria		
--Detection	271	152 368
--Mutations	270	152 477
Bacterial aerosols		
--Temperature factors	270	153 343
Bahamas circle	279	152 905
Balances		
--Calibration	336	171 202
Ballistic data		
--Nomographs	306	152 732
Batteries		
--Applications	298	149 726
Battery chargers		
--Development	293	149 703
Beaches		
--Massachusetts	278	149 638
Benzene derivatives		
--Physical properties	314	152 446
Bibliography		
--Aerial reconnaissance	263	153 387
--Aerial warfare	334	152 821
--Aviation medicine	265	171 333
	272	171 029
--Casting resins	316	171 034
--David Taylor Model Basin, Washington, D.C.	257	153 726
--Diamond Ordnance Fuze Labs., Washington, D.C.	293	153 496
--Human engineering	265	171 333
--Ice	281	171 190
--Iconoscopes	341	149 643
--Job analysis	264	153 110
--Optics	341	149 643
--Permafrost	281	171 190
--Photoelectric shutters	341	149 643
--Piezoelectric materials	341	149 643
--Reasoning	264	153 110
Bibliography (con.)		
--Rubber mounts	310	153 793
	257	153 727
--Snow	281	171 190
--Space medicine	272	171 029
--Space perception	268	153 575
--Training	260	171 332
--Transducers	293	153 496
Biological productivity	283	152 907
Birds		
--Alaska	279	153 345
Blast effects		
--Simulation	314	171 047
Blood		
--Coagulation	272	153 348
--Pathology	271	152 368
Blood circulation		
--Temperature factors	266	153 342
Blood clots		
--Inhibition	267	152 690
Blood volume		
--Determination	268	152 617
Body		
--Motion	259	149 211
Body temperature		
--Climatic factors	265	153 336
	266	153 351
Borel-Weil theorem	318	152 607
Boron compounds (Organic)		
--Synthesis	275	152 767
Boron halides		
--Chemical reactions	275	152 767
Boron hydrides		
--Toxic effects	273	171 309
Boundary layer		
--Mathematical analysis	327	152 738
Boundary layer control		
--Effectiveness	326	153 196
Broadband antennas		
--Development	288	152 728
Brune network	294	149 636
Burns		
--Pathological effects	271	152 368
--Production	271	152 599
Butadienes		
--Polymerization	332	171 041
Cadmium sulfide crystals		
--Electrical properties	345	171 338
Calibration		
--Equipment	336	171 202
Calorimeters		
--Analysis	348	152 966
Camera shutters		
--Development	352	171 197
Cameras		
--Equipment	352	152 565
Capacitance bridge		
--Applications	289	171 219
	290	171 220
		171 221
		171 222
		171 223
Capacitors		
--Calibration	289	171 219
	290	171 220
		171 221
		171 222
		171 223
Capillaries		
--Blood circulation	267	152 690
Carbon		
--Nuclear reactions	331	152 916
Carbon dioxide		
--Absorption	309	171 046
Carbo ships		
--Model test results	310	152 734
Cargo vehicles		
--Arctic regions	313	152 940
		152 942
--Design	313	152 940
Cathode ray tubes		
--Development	304	149 712
	338	152 960
Cathodes (Electron tubes)		
--Materials	295	152 735
	296	152 610
	337	152 962
--Test results	304	152 670
Cauchy problem	321	171 351
Cavitation		
--Measurement	328	147 535
Cavity resonators		
--Design	298	153 095
Celestial mechanics	258	171 196
	309	171 337
Centipede	301	152 937
Centrifugal pumps		
--Design	312	151 856-1
		152 856-2
	313	152 856-3
--Performance	312	152 856-1
		152 856-2

Subject	Page	PB Number
Centrifugal pumps (con.)		
--Performance (con.)	313	152 856-3
Ceramic coatings		
--Development	329	171 193
--Test results	314	171 047
Ceramic materials		
--Development	336	149 728
Cesium		
--Combustion	275	153 033
Character recognition	289	152 926
Chemical elements		
--Determination	274	153 571
Chemical reactions		
--Temperature factors	278	149 659
Chemical warfare agents		
--Absorption	272	149 634
--Colorimetric analysis	272	149 634
--Countermeasures	272	149 635
--Detection	339	149 641
Children		
--Physiology	267	152 763
Chloride ions		
--Determination	274	152 773
Chlorophylls		
--Photochemical reactions	278	149 658
Chloroplast	278	149 658
Circular coils		
--Impedance	302	171 353
Circulatory system		
--Climatic factors	267	153 338
--Pathology	272	153 348
--Physical factors	268	152 460
Cirrus clouds		
--Meteorological factors	280	152 700
Civilian defense systems	334	152 821
Climatic factors		
--Alaska	279	153 345
Clothing		
--Acceptability	336	149 688
--Military requirements	336	149 688
Cloud chambers		
--Applications	331	149 736
Clouds		
--Analysis	281	152 870
--Ice formation	280	153 391
Cobb Seamount	283	148 476
Combustion		
--Analysis	276	153 090
Communication systems		
--Signal to noise ratio	303	152 791
--Theory	288	152 984
	303	152 791
Commutators	322	152 761
		152 762
Complex ions		
--Analysis	274	152 772
		152 773
--Spectra	276	149 681
Conformal mapping		
--Theory	323	152 436
Conical bodies		
--Heat transfer	286	171 195
--Reflective effects	350	153 088
Control systems		
--Design	303	153 035
--Development	324	171 339
--Mathematical analysis	295	152 741
--Stability	295	152 741
--Test methods	307	152 778
--Theory	302	153 034
Convex bodies		
--Theory	321	149 663
Coordinate converter	374	149 797
Copolymerization	316	149 963
Copper oxides		
--Conductivity	346	152 694
--Crystal structure	346	152 694
Correlation functions		
--Applications	295	152 861
--Determination	257	152 834
	323	148 609
Cosmic radiation	333	152 911
--Energy	259	152 968
--Geophysical factors	331	149 736
--Measurement	258	148 494
		149 645
	259	148 495
--Nuclear reactions	331	149 736
--Physical effects	331	152 916
--Polarization	332	149 737
Couette flow	327	149 677
		152 857
	328	152 858
Coulomb potential	348	152 789
Coulomb scattering	332	149 650
Cowell's method	309	171 337
Crossed field amplifiers	300	152 995
Crystal filters		
--Development	297	149 708
		149 709
		149 710
Crystal oscillators		
--Circuits	293	152 922
--Design	289	149 722
		152 658
Crystal structure		
--Mathematical analysis	345	149 679
Crystal structure (con.)		
--Theory	339	152 863
Crystal units		
--Development	307	152 673
Crystals		
--Optical properties	341	152 624
--Thermodynamic properties	344	152 725
Cueing methods	260	153 460
Curved-earth computations	299	149 741
Curved mirrors		
--Corrosion	331	149 739
Cyanides		
--Spectra	276	149 681
Cyclic compounds		
--Molecular structure	275	149 664
	339	171 342
--Spectra	339	171 342
--Synthesis	275	149 664
Cylinders		
--Electromagnetic properties	338	152 777
--Materials	337	152 923
--Mathematical analysis	338	152 777
--Reflective effects	349	152 842
Cylindrical shells		
--Deformation	324	149 691
--Stresses	324	149 691
--Vibration	336	149 682
Cytochrome c		
--Purification	269	152 470
Dark adaption		
--Equipment	302	161 968
Data		
--Processing	300	152 935
Data storage systems		
--Circuits	296	147 313
--Coding	351	152 787
--Design	300	152 935
--Development	299	152 409
--Military requirements	351	152 787
Data transmission systems		
--Circuits	297	152 958
--Design	300	152 721
--Errors	351	152 933
Delay lines		
--Applications	299	152 629
Destructive testing	351	152 897
Destructors		
--M*A1	306	152 596
Deuterons		
--Scattering	332	149 732
Diagraphs	301	152 833
Dielectric properties		
--Measurement	345	152 544
Dielectrics		
--Development	336	149 728
--Mathematical analysis	345	152 544
--Refractive properties	343	149 628
Dies		
--Production	313	152 724
Difference equations	320	149 644
Difference fields	317	152 675
Difference method	318	152 715-1
		152 715-2
Differential equations		
--Applications	295	152 741
--Theory	320	149 644
	322	153 382
	344	152 725
Diffraction		
--Mathematical analysis	350	153 088
--Measurement	336	152 730
--Theory	349	152 842
Diffusion		
--Mathematical analysis	344	152 683
Diodes		
--Applications	299	152 750
Dipole antennas		
--Design	284	152 623
Direction finding antennas		
--Design	297	152 671
Disease carriers		
--Alaska	273	153 331
Display systems		
--Development	299	152 409
	305	152 536
--Human engineering	263	171 313
Diversity systems		
--Development	288	152 984
Drag		
--Mathematical analysis	306	153 058
Dyes		
--Physical properties	314	152 446
Early warning radar systems (Airborne)		
--Performance	299	149 741
Earth		
--Radiation	332	149 650
Economic conditions		
--Haiti	282	152 893
--Honduras	282	152 892
Elastic shells		
--Stresses	324	148 405
Elasticity		
--Mathematical analysis	324	149 691
		149 756
Elasticity (con.)		
--Theory	324	152 609
Elastomers		
--Molecular structure	316	153 172
--Stresses	316	153 172
Electric batteries		
--Development	311	171 050
Electric discharges		
--Physical factors	325	152 602
Electric fields		
--Physical effects	342	152 473
Electric filters		
--Design	299	152 629
--Development	292	152 254
Electric propulsion		
--Instrumentation	311	171 050
Electric relays		
--Development	309	149 704
Electrical equipment		
--Calibration	292	171 201
		171 208
Electrical networks		
--Mathematical analysis	294	149 637
	295	147 314
--Performance	304	152 986
--Synthesis	294	149 636
		152 486
		152 489
	295	147 314
	296	152 860
	304	152 986
Electrocardiography	268	152 460
--Test results	267	152 763
Electrochemistry	276	149 675
Electrodes		
--Polarization	298	149 726
Electrolytic cells		
--Temperature factors	276	149 675
Electromagnetic fields		
--Mathematical analysis	338	152 868
Electromagnetic theory	338	152 868
--Mathematical analysis	336	152 869
Electromagnetic waves		
--Diffraction	350	153 088
--Propagation	347	152 633
	349	152 987
	350	152 418
		152 929
		152 963
		152 993
--Reflection	298	152 823
		152 824
--Scattering	320	152 431
	349	152 842
	351	152 981
Electron beams		
--Analysis	300	152 995
--Configuration	301	152 938
--Control	338	152 960
--Electromagnetic effects	299	152 948
Electron guns		
--Design	301	152 938
Electron optics	338	152 960
Electron tube heaters		
--Design	304	149 712
Electron tubes		
--Life expectancy	319	152 896
Electronic circuits		
--Development	298	152 672
--Equipment	293	149 703
Electronic equipment		
--Cooling	305	171 345
--Development	295	152 859
--Human engineering	300	152 935
--Performance	304	161 894-1
Electronic systems		
--Preservation	294	153 273
Electrons		
--Density	283	152 697
--Electrical effects	349	152 523
--Energy	333	171 335
--Intensity	349	147 558
Emotions		
--Psychological effects	263	153 325
Encapsulating techniques	316	171 034
Encke's method	309	171 337
Equations of state		
--Determination	344	152 725
Errors		
--Theory	332	152 736
Eskimos		
--Physiology	266	153 328
		153 341
Evaporation		
--Measurement	277	153 606
Exhaust diffusers		
--Effectiveness	311	171 308
Exhaust gases		
--Heat transfer	348	152 966
--Physical effects	287	153 629
Exosphere	258	152 936
Experimental data		
--Statistical analysis	319	152 896
Explosive charges		
--Blast	306	149 633
Exposure		
--Physiological effects	265	153 336

Subject	Page	PB Number
Exposure (con.)		
--Physiological effects (con.)	266	153 351
	267	152 695
		153 338
		153 352
	268	152 618
		153 337
	269	153 344
F-86	286	153 630
Factor analysis		
--Applications	262	153 506
	264	148 004
Ferrites		
--Applications	293	152 581
	297	152 660
--Electromagnetic properties	337	152 923
	350	152 418
--Magnetic properties	345	149 738
--Molding	313	152 724
--Properties	301	152 847
--Temperature factors	345	149 738
Ferromagnetic crystals		
--Analysis	336	149 728
--Magnetic properties	344	152 854
Ferromagnetic materials		
--Applications	305	153 226
--Development	305	153 226
--Magnetic properties	337	153 277
--Theory	338	152 868
Ferromagnetism		
--Theory	337	149 654
Field emission		
--Equipment	276	152 770
--Instrumentation	304	152 670
Filing cabinets		
--Demolition	306	152 596
Fire control		
--Mathematical analysis	307	152 845
Fission fragments		
--Spectra	304	153 030
Flame propagation		
--Analysis	276	153 090
Fleas		
--Alaska	273	153 331
Flight decks		
--Equipment	331	149 739
Flight simulators		
--Development	286	152 885
Fluid flow		
--Stability	327	152 857
	328	152 858
--Turbulence	326	149 686
--Viscosity	327	152 857
	328	152 858
Fluids		
Heat transfer	348	150 036
	349	150 035
Fluorimetric method	272	149 634
Fluorine compounds (Organic)		
--Surface properties	277	150 619
--Synthesis	274	149 683
Flutter		
--Mathematical analysis	285	147 554
Flying platforms		
--Design	285	153 624
Fourier series		
--Applications	282	152 799
Fourier transforms	310	152 431
Free radicals		
--Detection	277	171 310
--Spectrographic analysis	276	152 770
Frequency meters		
--Calibration	299	171 216
Frequency shift keyers		
--Mathematical analysis	288	152 985
Frostbite		
--Therapy	266	153 353
Fuel cells	311	171 050
Fuels		
--Toxic effects	273	171 309
Functions		
--Analysis	322	152 737
--Theory	317	152 674
	319	152 375
	338	152 777
Games theory		
--Applications	319	148 500
Gamma radiation		
--Chemical effects	332	171 041
--Measurement	333	153 790
--Penetration	335	171 341
--Reflection	335	171 341
Gas discharges		
--Analysis	338	153 089
Gas flow		
--Analysis	327	152 738
--Mathematical analysis	276	153 091
	327	149 677
Gas ionization	333	171 335
--Electrical factors	348	153 789
--Measurement	348	153 137
Gases		
--Combustion	276	153 090
--Thermodynamic properties	314	149 665
Gendare system	323	152 727

Subject	Page	PB Number
Geography		
--Haiti	282	152 893
--Honduras	282	152 892
Geology	278	149 638
Germanium		
--Dielectric properties	343	149 628
--Impurities	344	152 973
--Photoconductivity	344	152 973
--Temperature factors	344	152 973
Glaciers		
--Geophysical effects	278	149 638
Glycines		
--Physiological effects	266	153 353
Graft copolymers	316	149 963
Gravity		
--Determination	282	152 799
		152 800
Gravity anomalies	282	152 799
		152 800
Green function	319	152 369
	338	152 777
Grenades		
--Design	306	152 597
--E17R1	306	152 597
--M6	306	152 597
--Stability	306	152 597
Group dynamics		
--Psychological factors	264	152 913
	265	152 889
Groups (Mathematics)	323	152 436
--Theory	218	152 607
	323	152 747
Hail		
--Growth	280	153 391
--Physical properties	280	152 775
--Velocity	280	152 774
Harmonic functions		
--Determination	322	148 066
Harmonic oscillators		
--Statistical analysis	319	148 500
Hartree-Fock	339	149 639
	344	152 854
Heart		
--Physiology	268	152 460
Heart beat		
--Measurement	268	153 037
Heat equation	319	152 376
Heat production (Biology)		
--Measurement	268	153 337
Heat resistant alloys		
--Mechanical properties	329	171 198
	330	152 463
--Metallurgy	329	149 655
Heat transfer		
--Determination	327	152 557
--Measurement	348	152 966
Helicopter rotors		
--Flutter	285	147 554
Helicopters		
--Control systems	287	152 625
--Design	286	149 666
--Ice formation	326	153 195
--Lateral stability	287	152 625
--Longitudinal stability	287	152 831
Helium		
--Spectra	258	152 946
--Spectrographic analysis	338	152 664
Heparin		
--Physiological effects	267	152 690
High altitude		
--Physical effects	315	171 306
--Physiological effects	267	152 763
High pressure research	330	171 348
High speed cameras		
--Applications	308	171 352
--Development	341	171 191
--Equipment	352	171 197
High speed photography		
--Applications	308	171 352
High temperature research	276	149 675
	330	171 348
Hilbert space	322	152 761
		152 762
Human engineering		
--Bibliography	265	171 333
--Military requirements	259	149 211
Hydrazine derivatives		
--Chemical reactions	275	149 687
Hydrocarbons		
--Electrical properties	337	149 725
--Optical properties	277	149 631
--Spectra	275	171 300
Hydrofoils		
--Cavitation	328	147 535
Hydrogen		
--Propellant properties	311	153 791
Hydrophones		
--Design	302	152 979
Hyperbolic equations		
--Theory	318	149 646
Hypersonic flow		
--Boundary layer	327	152 537
--Heat transfer	326	152 947
	327	152 537
Hypersonic test vehicles		
--Aerodynamic characteristics	286	171 195

Subject	Page	PB Number
Hypersonic test vehicles (con)		
--Recording devices	293	171 194
Hypersonic wind tunnels		
--Equipment	327	149 344
Hypervelocity projectiles		
--Penetration	307	152 729
Hypervelocity vehicles		
--Control systems	307	152 778
Hypothermia		
--Physiological effects	266	153 342
Ice		
--Bibliography	281	171 190
--Radar analysis	349	152 987
--Thickness	349	152 987
Ice crystals		
--Growth	280	152 775
Ice formation (Aeronautics)		
--Meteorological factors	279	152 977
--Simulation	326	153 195
Iconoscopes		
--Bibliography	341	149 643
Impact shock		
--Measurement	311	153 272
--Physical effects	307	152 729
Impact testing	314	171 311
Impedance		
--Measurement	301	152 833
	303	149 647
Incendiary mixtures		
--Effectiveness	271	152 599
--Test results	306	152 596
Indium films		
--Superconductivity	346	152 901
Inequalities	318	149 646
Information theory	302	153 034
	303	153 035
	351	152 787
Infrapolynomials	319	152 371
Infrared detectors		
--Design	307	153 100
--Equipment	339	149 641
--Signal to noise ratio	340	152 714-3
Infrared equipment (Airborne)		
--Development	340	152 714-2
		152 714-4
	341	152 713
Infrared filters		
--Applications	340	152 714-1
--Development	340	149 657
--Materials	339	149 641
	340	149 657
Infrared optical materials		
--Development	341	152 624
Infrared spectra		
--Analysis	339	171 342
Infrared waves		
--Absorption	339	171 342
--Measurement	340	152 714-4
Instructors		
--Attitudes	260	149 642
Instruments		
--Calibration	289	171 209
		171 212
		171 213
	290	171 205
		171 210
		171 220
		171 221
		171 222
		171 223
	291	171 206
		171 207
		171 211
		171 214
		171 215
		171 217
		171 218
	292	171 200
		171 201
		171 204
		171 208
		171 216
	328	171 203
	336	171 202
Integral equations	320	149 729
		152 431
Integral functions	319	152 972
Interferometers		
--Applications	340	152 714-4
Interior ballistics		
--Mathematical analysis	306	152 732
International Geophysical Year	258	148 494
	281	152 930
	308	152 522
	350	171 377-7
Ion beams		
--Application	312	171 305
Ion bombardment		
--Applications	333	171 335
Ion exchange		
--Theory	277	153 588
Ion exchange resins		
--Applications	269	152 470
--Theory	277	153 588
Ion propulsion	312	171 305
Ion rocket propulsion	310	153 587

Subject	Page	PB Number
Ionic current		
--Measurement	298	149 726
Ionization chambers		
--Calibration	259	148 495
Ionosphere		
--Analysis	283	152 697
		153 050
--Electromagnetic properties	349	147 558
	350	152 963
--Motion	284	152 696
--Reflective effects	298	152 823
		152 824
--Wave transmission	349	152 466
Ionospheric disturbances		
--Greenland	336	153 279
Ionospheric scatter	297	152 958
Ions		
--Motion	348	152 789
--Scattering	348	152 137
Iron		
--Internal friction	331	152 691
Iron borides		
--Magnetic properties	337	153 277
Iron phosphides		
--Magnetic properties	337	153 277
Jet engine fuels		
--Combustion	315	171 306
--Contamination	315	171 303
--Moisture content	315	171 303
Jet propulsion	310	148 777
Job analysis		
--Applications	261	152 783
--Bibliography	264	153 110
--Psychological factors	264	153 110
Kaehler manifolds	323	152 436
Kantrowitz problem	276	153 091
Kidneys		
--Blood circulation	269	171 343
Klystrons		
--Performance	299	152 948
Ladder networks	294	152 489
Laminates		
--Test methods	330	171 044
Landing aids		
--Development	331	149 739
Landing fields		
--Erosion	287	153 629
Landing mats		
--Applications	287	153 629
Language		
--USSR	351	149 685
Lead telluride		
--Electrical properties	345	171 356
Learning		
--Test methods	260	153 460
Lie groups	318	152 606
Lift		
--Analysis	326	153 196
Light		
--Physical effects	337	149 654
--Physiological effects	266	153 326
--Polarization	277	149 631
--Scattering	277	149 631
Linear accelerators		
--Design	301	152 652
Lipids		
--Metabolism	268	152 618
Liquids		
--Measurement	277	153 606
--Vaporization	277	153 606
Lithium hydroxides		
--Applications	309	171 046
Loop antennas		
--Design	303	149 647
Lopair	339	149 641
Lubricants		
--Temperature factors	315	153 476
--Test results	315	153 476
Luminescence		
--Physical factors	341	152 731
Machine translations		
--Instrumentation	351	149 685
Magnesium oxide crystals		
--Deformation	343	149 684
Magnetic cores		
--Development	323	153 274
Magnetic fields		
--Mathematical analysis	344	152 854
--Physical effects	349	152 573
Magnetic materials		
--Spectrographic analysis	344	152 462
Magnetic modes	337	152 923
Magnetic resonance		
--Theory	338	152 868
Magnetic tapes		
--Test results	293	171 194
Magneto-hydrodynamic waves	346	152 742
--Applications	312	152 749
--Propagation	346	152 912
Magneto-ionic ducts	350	152 963
Magnetrons		
--Development	303	149 630
	338	152 960
Maintenance personnel		
--Performance	261	152 788
--Test methods	261	152 783
Mammals		
--Alaska	279	153 345
Marine biology	283	152 907
--Pacific Ocean	283	148 426
Mars		
--Exploration	308	152 939
Mass spectrometers		
--Applications	276	152 770
Mathematical computer data		
--Coding	324	149 297
	335	171 341
--Processing	323	153 596
		153 597
Mathematical computers		
--Applications	263	152 703
--Circuits	299	152 750
--Design	324	149 297
--Equipment	323	153 274
--Human engineering	323	153 596
		153 597
--Scheduling	258	171 196
	307	152 845
	320	152 894
	321	153 053
	323	149 609
		152 722
--Theory	324	171 339
Mathematical logic	321	152 723
Mathematical prediction		
--Applications	335	153 070
Matrix algebra	320	152 894
--Applications	294	149 637
Measure theory	322	152 737
Mechanics (Personnel)		
--Test methods	262	152 756
Mesons		
--Decay	332	149 733
		149 737
--Nuclear reactions	333	152 911
--Polarization	332	149 737
Metabolism		
--Climatic factors	266	153 341
		153 351
	267	152 695
	268	152 618
	269	153 344
Metallurgy		
--USSR	329	171 307
Metals		
--Availability	329	161 226
--Corrosion	285	171 344
	331	171 301
--Deformation	330	153 882
--Diffusion	344	152 683
--Fracture	330	153 882
--Heat treatment	330	161 213
--Machining	313	161 225
--Mechanical properties	329	171 198
--Processing	325	153 109
--Production	329	161 226
Meteorological ballons		
--Applications	258	148 494
	259	148 495
--Flight paths	280	152 699
Meteorological charts		
--Northern hemisphere	281	152 930
Meteorological data		
--Greenland	280	152 952-1
		152 952-2
--North America	280	152 952-1
		152 952-2
--Processing	279	152 905
--Recording devices	280	152 699
--Statistical analysis	278	152 701
	280	153 064
	281	152 769
--Tables	280	152 952-1
		152 952-2
--Transmission	278	152 684
Meteorological radar		
--Applications	280	152 774
	334	152 661
Meteorology		
--Asia	279	149 668
		152 613
--Pacific Ocean	279	152 613
--Tropical regions	279	149 668
		152 613
Metric spaces	332	152 736
Michigan	269	152 605
	305	152 536
Microorganisms		
--Viability	270	153 573
Microphones		
--Design	296	152 603
Microschmidt	259	153 278
Microwave amplifiers		
--Development	300	152 995
Microwave equipment	301	152 847
--Calibration	292	171 204
--Development	293	152 581
--Materials	297	152 660
	305	153 226
Microwave oscillators		
--Development	300	152 995
Microwaves		
--Refraction	283	152 951
Military personnel		
--Alaska	310	153 339
--Nutrition	310	153 339
Miniature electronic equipment		
--Circuits	298	152 672
--Design	296	152 603
--Development	293	152 922
Mirrors		
--Electroforming	313	153 883
--Preparation	341	171 191
Missile antennas		
--Design	303	149 647
Missile boosters		
--Materials	316	153 620
Missile personnel		
--Training	261	152 580
Missile tracking systems		
--Handbooks	261	152 580
Missiles		
--Drag	306	153 058
--Electrical systems	309	149 704
--Stability	306	153 058
Molecular association		
--Energy	278	149 659
Molecular beams		
--Reflection	337	152 882
--Velocity	337	152 882
Molecular sieve	309	171 051
Molecular spectroscopy	339	152 863
Molecular structure		
--Theory	339	149 680
		152 683
Molecules		
--Energy	276	153 091
Mollier diagrams	311	153 791
Moon		
--Exploration	257	152 846
--Reflective effects	349	152 466
--Motion	258	171 196
Motion picture screens		
--Design	352	152 997
Motor reactions		
--Measurement	263	152 744
Multipath transmission		
--Applications	288	152 984
Naval aviation		
--Training devices	260	149 642
Naval ordnance		
--Test facilities	308	153 867
Naval personnel		
--Selection	261	152 626
Naval research	352	171 315
Naval reserve	261	152 626
Negative ions	348	152 137
Nervous system		
--Physiology	270	153 349
	271	153 330
		153 350
Neutron fluxes		
--Measurement	333	153 790
Neutrons		
--Scattering	332	149 732
Newtonian theory	306	153 058
Nickel		
--Bonding	331	152 880
--Electrodeposition	313	153 883
--Stresses	331	152 880
Nickel alloys		
--Applications	295	152 735
--Mechanical properties	309	153 062
Night flight		
--Visual factors	266	153 326
Night television	302	161 968
Nitrogen oxides		
--Corrosive effects	331	171 301
Noise (Radio)		
--Analysis	302	153 576
		153 577
--Measurement	350	151 377-7
Non-destructive testing		
--Applications	309	152 988
Non-linear differential equations		
--Theory	320	149 730
Nuclear reactions		
--Mathematical analysis	332	149 733
Nuclei		
--Magnetic fields	344	152 854
Nucleic acids		
--Analysis	269	152 740
Numbers		
--Theory	320	152 894
	332	152 736
Ocean bottom		
--Atlantic Ocean	282	152 908
Oceanographical data		
--Atlantic Ocean	282	153 625
Officer personnel		
--Selection	261	152 626
	262	153 572
Operators (Mathematics)	322	152 761
		152 762
--Theory	318	149 646
	323	152 747
Optical images		
--Meteorological factors	257	152 834
Optics		
--Bibliography	341	149 643

Subject	Page	PB Number
Ordnance steel		
--Temperature factors	309	153 062
Organic compounds		
--Conductivity	342	171 340
--Photochemical reactions	276	152 770
--Seperation	309	171 051
Originality	264	152 913
Oxide cathodes		
--Performance	295	152 735
Oximes		
--Metabolism	272	149 635
Oxygen		
--Ionization	348	152 137
--Propellant properties	311	153 791
Ozone		
--Chemical effects	317	171 043
Pain thresholds		
--Measurement	266	153 328
Paints		
--Development	335	153 570
Paper capacitors		
--Effects of radiation	288	153 096
Parabolic antennas		
--Focusing	305	152 776
--Radiation	299	152 949
Parachute fabrics		
--Test methods	314	171 311
Parachutes		
--Testing equipment	314	171 311
Partial differential equations		
--Theory	318	152 715-1
		152 715-2
	319	152 376
	321	171 349
		171 350
		171 351
		171 354
		171 355
	322	153 275
Particle accelerators		
--Performance	312	152 959
Particles		
--Density	347	171 336
--Determination	332	149 650
--Scattering	333	171 335
--Stability	331	149 736
Particles (Airborne)		
--Physical properties	335	153 068
--Precipitation	335	153 070
--Radioactivity	334	152 661
	335	153 068
		153 070
Particulate filters		
--Applications	309	171 051
Penetration problems	335	171 341
Peptides		
--Molecular structure	314	152 446
Permafrost		
--Bibliography	281	171 190
Personnel		
--Performance	264	152 913
--Test methods	264	148 004
--Training	268	147 305
Perspiration		
--Measurement	266	153 341
Perturbation theory	320	149 644
--Applications	309	171 337
Phase modulation		
--Equipment	293	152 581
Phase shifters		
--Applications	297	152 958
Phenocopies	270	152 477
Phenyl ether		
--Dipole moments	276	149 678
Phenyl sulfide		
--Dipole moments	276	149 678
Phosphors		
--Luminescence	305	152 536
Phosphorus		
--Metabolism	267	152 695
Photoelectric cells		
--Applications	277	153 606
	307	153 100
--Development	342	149 706
--Materials	346	152 694
Photoelectric materials		
--Applications	299	152 409
Photoelectric shutters		
--Bibliography	341	149 643
Photographic film		
--Processing	352	152 564
		152 565
Photometry		
--Applications	274	153 571
Photosynthesis		
--Analysis	278	149 658
Physical chemistry	314	152 446
Piezoelectric crystals		
--Applications	296	152 603
	305	152 536
--Bibliography	341	149 643
Pilots		
--Training	259	150 317
--Training devices	286	152 885
Pitot tubes		
--Applications	276	153 091

Subject	Page	PB Number
Planetary atmospheres		
--Density	258	152 936
Planets		
--Catalogs	258	171 196
Plasma (Physics)	301	152 847
	312	152 749
		152 959
	338	152 664
		152 960
		153 089
	346	152 742
	347	152 633
--Applications	347	152 996
--Electromagnetic factors	347	152 955
		152 996
	350	152 418
--Temperature factors	347	153 626
--Theory	346	152 912
	347	153 626
		171 336
Plastic coatings		
--Effectiveness	314	152 862
Plasticity		
--Theory	325	153 109
Plastics		
--Applications	316	153 620
--Wave transmission	315	150 013
Poincare-Lighthill-Kuo method	327	152 738
Polymerization		
--Effects of radiation	332	171 041
	277	171 310
Polynomials		
--Theory	319	152 371
Potassium chloride crystals		
--Luminescence	341	152 731
Precipitation		
--Measurement	281	153 046
--Radar analysis	334	152 661
Pressure		
--Metallurgical effects	330	171 348
Pressurized cabins		
--Cooling	305	171 345
Primates		
--Effects of radiation	273	152 630
--Testing equipment	263	152 744
Primers		
--Development	308	152 839
	309	152 840
Printed circuits		
--Development	323	153 274
Probability (Statistics)	317	152 883
	320	152 934
--Applications	295	152 741
--Theory	318	171 312
	320	152 900
	321	149 663
		171 327
Propellant grains		
--Heat transfer	308	152 826
	315	152 825
--Temperature	315	152 825
Propellants		
--Combustion	275	153 033
--Thermodynamic properties	314	149 665
Protective shelters		
--Development	294	153 273
Protons		
--Scattering	332	149 732
Psychiatry	265	152 764
Psycomotor tests		
--Physiological factors	269	171 304
Public health		
--Periodicals	273	161 371-9
Pulse analyzers		
--Circuits	334	153 621
Pulse generators		
--Applications	344	152 925
Pyridines		
--Metabolism	272	149 635
Pyrimidines		
--X-ray analysis	269	152 740
Quality control		
--Theory	351	152 897
Quartz crystals		
--Electrical properties	343	149 695
		149 696
--Frequency measurement	343	149 695
		149 696
--Growth	342	149 692
--Physical properties	341	149 721
		149 723
	342	149 724
Quartz resonators		
--Frequency measurment	343	149 696
--Oscillator circuits	289	149 722
		152 658
RADC reliability notebook	304	161 894-1
Radar duplexers		
--Development	300	152 668
Radar operators		
--Psychological factors	263	153 325
Radar receivers		
--Calibration	308	152 759
Radar reflectors		
--Test results	299	152 949
Radar scanning		
--Theory	293	152 655

Subject	Page	PB Number
Radar targets		
--Detection	293	152 655
Radiation		
--Chemical effects	277	171 310
--Measurement	340	152 714-3
--Physiological effects	273	152 630
--Sources	258	149 645
Radiation counters		
--Calibration	333	152 768
Radiation damage		
--Countermeasures	317	150 961
Radiation injuries		
--Pathology	273	153 589
Radiation meters		
--Calibration	333	153 622
--Performance	333	153 790
Radio equipment		
--Maintenance	261	152 783
		152 788
Radio interference		
--Measurement	296	152 992
Radio receivers		
--Equipment	296	152 992
--Sensitivity	296	152 992
Radio signals		
--Detection	288	152 985
--Distortion	302	153 576
		153 577
Radio waves		
--Applications	284	152 696
--Propagation	349	149 740
--Reflection	349	147 558
--Scattering	349	152 523
Radioactive analysis		
--Applications	332	153 071
Radiochemistry		
--Theory	277	171 310
Radio frequencies		
--Standards	289	149 722
		152 658
Radiofrequency filters		
--Design	288	153 003
Radiography		
--Applications	309	152 988
Radiological contamination		
--Countermeasures	273	161 371-9
	334	152 698
	335	153 570
Radiological warfare		
--Psychological effects	334	152 821
Radiometers		
--Design	340	152 714-2
		152 714-3
Radiosondes		
--Applications	279	152 905
Raman spectroscopy	276	149 681
Ramjet engines		
--Model test results	315	171 306
Rations (Military)		
--Nutritive value	310	153 339
Rawinsonde data	280	152 699
Reaction (Psychology)		
--Mathematical analysis	265	152 535
--Statistical analysis	264	152 621
--Test methods	263	152 744
Reactors		
--Hazards	333	153 790
Real gas effects	327	152 557
Reasoning		
--Biliography	264	153 110
--Theory	264	148 004
Recombination ramjet engines	310	148 777
--Design	310	153 587
Recombination reactions	278	149 659
Re-entry aerodynamics	308	152 759
	327	152 557
Re-entry turbines	312	152 856-1
		152 856-2
	313	152 856-3
Reflectometers		
--Design	341	149 651
Reflex klystrons		
--Development	303	149 629
Refractometers		
--Applications	283	152 951
Refractory materials		
--Applications	296	152 610
Refrigerants		
--Heat transfer	348	150 036
	349	150 035
--Vaporization	305	171 345
Reliability		
--Military requirements	304	161 894-1
Remote control systems		
--Applications	334	152 698
Resins		
--Casting	316	171 034
--Combustion	306	152 596
--Electrical properties	316	171 034
Resistors		
--Calibration	290	171 205
	291	171 206
		171 207
		171 211
	292	171 200
Respiratory system		
--Climatic factors	268	153 337

Subject	Page	PB Number
Rhodium compounds		
--Synthesis	274	152 773
Rhythm		
--Measurement	274	152 631
Rita	340	152 714-1
Rocket antennas		
--Design	284	152 623
Rocket cases		
--Materials	316	153 620
Rocket launchers		
--Blast effects	314	171 047
--Coatings	314	171 047
Rocket motor noise		
--Countermeasures	311	171 308
Rocket motor nozzles		
--Test results	311	161 227
Rocket motors		
--Performance	311	153 791
--Shock resistance	311	153 272
--Temperature	308	152 826
--Test methods	309	152 988
--Testing equipment	311	153 272
Rocket oxidizers		
--Corrosive effects	331	171 301
Rocket propellants		
--Thermodynamic properties	311	153 791
Rocket propelled sleds		
--Aerodynamic characteristics	305	152 743
Rocket propulsion	310	148 777
--Theory	310	153 587
	312	171 305
Rodents		
--Physiology	274	152 631
Rotor blades		
--De-icing systems	326	153 195
Rubber		
--Climatic factors	317	171 042
--Effects of radiation	317	150 961
--Preservation	317	171 043
--Storage	317	171 042
--Temperature factors	317	171 042
Rubber mounts		
--Bibliography	310	153 793
Runways		
--Design	287	153 629
Ruthenium		
--Determination	274	152 772
Sampling (Statistics)		
--Applications	351	152 897
Sand		
--Sources	278	149 638
Sandwich panels		
--Welding	286	149 718
Sapphires		
--Crystal structure	345	152 544
Satellite vehicle research	258	149 645
	278	152 684
Satellite vehicle trajectories		
--Determination	308	152 522
--Mathematical analysis	309	171 337
--Physical factors	308	152 939
Satellite vehicles		
--Applications	257	152 846
	283	153 050
--Detection	307	153 100
	340	152 714-3
--Equipment	305	171 345
	307	152 673
--Surfaces	307	153 885
--Temperature	307	153 885
--Tracking	308	152 522
	321	153 053
SBR vulcanizates	317	171 043
SC-275	304	149 712
Scheduling		
--Applications	320	152 934
Schistosoma		
--Alaska	271	153 332
Schlieren photography		
--Applications	308	171 352
Schubert calculus	318	152 607
Scientific reports		
--Bibliography	257	153 726
Scientific research	352	171 315
Sea water		
--Analysis	274	153 571
--Corrosive effects	285	171 344
	331	149 739
--Desalination	285	171 344
Selenium		
--Crystal structure	344	152 925
Semiconductors		
--Applications	324	149 297
--Conductivity	344	152 925
--Crystal structure	345	149 679
--Development	344	152 462
--Electrical properties	342	152 473
	346	152 628
--Materials	342	149 706
		171 340
--Properties	346	152 694
Sequential analysis		
--Applications	317	152 883
Sergeant	309	152 988
Series expansions		
--Applications	319	152 376

Subject	Page	PB Number
Sheets		
--Boundary layer	327	152 738
--Cavitation	328	149 640
--Deformation	325	153 109
--Heat transfer	326	152 947
--Hydrodynamic characteristics	328	149 640
--Oscillation	328	152 906
--Pressure distribution	326	171 302
--Tensile properties	330	171 044
--Vibration	325	152 632
Ships		
--Vibration	310	153 793
Shivering		
--Inhibition	270	153 349
	271	153 330
		153 350
Shock waves		
--Measurement	347	153 626
--Oscillation	326	171 302
--Photographic analysis	308	171 352
--Propagation	346	152 912
--Reflection	306	149 633
--Theory	327	152 537
Shrouded propellers		
--Aerodynamic characteristics	287	152 898
--Pressure distribution	287	152 898
Silicon		
--Dielectric properties	343	149 628
Silicon carbide crystals		
--Growth	346	152 628
Silicon crystals		
--Applications	303	152 659
Silver chloride crystals		
--Deformation	343	152 891
--Stresses	343	152 891
--Temperature factors	343	152 891
Silver iodide		
--Conductivity	298	149 726
Simplex system	351	152 787
Single crystals		
--Deformation	343	149 684
--Electrical properties	345	171 356
--Fracture	343	149 684
--Growth	336	149 728
	346	152 628
--Magnetic properties	344	152 932
Skin		
--Sensitivity	266	153 328
Smear cameras	308	171 352
Smoke pots		
--Effectiveness	306	152 595
--MS HC	306	152 595
Smoke screens		
--Production	306	152 595
Snow		
--Bibliography	281	171 190
Snow crystals		
--Meteorological factors	281	152 541
Snow vehicles		
--Test results	313	153 320
Snowmobile	313	153 320
Sodium chloride crystals		
--Deformation	343	149 684
Sodium iodide crystals		
--Luminescence	341	152 731
Soils		
--Moisture content	284	153 884
--Radioactive analysis	332	153 071
--Trafficability	284	153 884
Solar atmosphere		
--Spectra	258	152 946
Solar energy		
--Applications	342	149 706
Solar flares		
--Radiation	331	152 916
Solids		
--Magnetic properties	344	152 462
--Physical properties	345	149 690
--Thermodynamic properties	348	171 329-1
--Wave transmission	345	149 690
Sonar personnel		
--Performance	264	152 888
Sonar signals		
--Detection	264	152 888
Space charges		
--Electrical effects	337	149 725
--Electromagnetic effects	301	152 938
Space flight		
--Physiological effects	268	152 460
	265	152 764
--Simulation	263	152 744
--Theory	308	152 939
Space medicine		
--Bibliography	272	171 029
Space perception		
--Bibliography	268	153 575
Space reconnaissance	307	153 100
Spaceships		
--Propulsion	310	148 777
		153 587
	312	152 749
		152 959
Spade	334	152 821
Spark machining		
--Applications	313	161 225

Subject	Page	PB Number
Spectrometers		
--Applications	340	152 714-4
--Design	341	152 713
Spectroscopy	339	152 864
--Applications	336	149 728
Spheres		
--Elasticity	324	148 405
--Stresses	325	152 779
Squid	328	149 689
Stability		
--Determination	306	153 058
Stainless steel		
--Fracture	331	152 880
--Welding	286	149 718
Standing wave indicators		
--Testing equipment	292	171 204
Standing wave ratios		
--Measurement	292	171 204
Stars		
--Photography	259	153 278
--Radiation	257	152 834
Statistical analysis		
--Reliability	281	152 769
--Theory	318	171 312
	321	171 327
Statistical functions	320	152 900
Statistics		
--Functions	317	152 883
Steel		
--Availability	338	151 097
--Extrusion	330	151 097
--Heat treatment	330	161 213
--Internal friction	331	152 691
--Mechanical properties	330	151 097
--Tensile properties	330	171 044
--USSR	329	171 331
Steroids		
--Determination	270	153 327
Stochastic processes	320	152 900
Storms		
--Radar analysis	280	152 774
Strainers		
--Applications	309	171 051
Streak camera	341	171 191
Stress analysis		
--Theory	324	149 756
Stresskin	286	149 718
Structures		
--Elasticity	285	171 192
--Mechanical properties	328	152 906
Styrenes		
--Polymerization	316	149 963
	332	171 041
Submarines		
--Safety measures	309	171 046
		171 051
Subminiature electronic equipment		
--Development	304	152 670
Sulfides		
--Disproportionment	276	152 478
Sulfur compounds (Organic)		
--Molecular structure	276	152 746
Sulfur dioxide		
--Luminescence	277	153 158
--Spectra	277	153 158
Sun		
--Physical effects	317	171 042
Superconductivity		
--Physical factors	346	152 901
Superpower cathode	337	152 962
Supersonic flow		
--Meteorological factors	325	152 602
Supersonic wind tunnels		
--Acoustic properties	326	152 529
--Electrical factors	325	152 602
--Pressure distribution	326	152 529
Surfaces		
--Coatings	335	153 570
Survival		
--Arctic regions	263	153 325
	269	153 344
Survival kits		
--Arctic regions	335	153 346
--Development	335	153 346
Switching circuits		
--Synthesis	299	152 750
Systems engineering		
--Theory	263	152 757
Target recognition		
--Visual factors	263	153 387
	269	152 605
Targets		
--Detection	269	152 605
Tchebycheff inequality	321	149 663
Teaching machines	260	153 460
Telegraph signals		
--Coding	289	152 926
Telephone communication systems		
--Circuits	351	152 933
Telescopes		
--Design	259	153 278
Teletype systems		
--Development	300	148 282
Television equipment		
--Design	302	161 968

Subject	Page	PB Number
Temperature		
--Determination	283	152 669
--Measurement	347	153 626
Tensiometers		
--Calibration	328	171 203
Terrestrial magnetism		
--Analysis	332	149 650
Tetrodes		
--Test results	296	149 694
Thermal radiation		
--Absorption	307	153 885
Thermionic emmission	295	152 735
--Mathematical analysis	296	152 610
--Measurement	337	152 962
Thin films		
--Applications	298	152 672
--Properties	346	152 901
Thyroid gland		
--Physiology	269	153 344
Time interval counters		
--Development	334	153 621
Tin compounds (Organic)		
--Synthesis	274	149 683
Tiros	278	152 684
Tongue of the ocean	282	153 625
Topology	318	152 606
	322	149 649
	323	152 747
--Applications	294	149 636
Toto	282	153 625
Tracking		
--Equipment	263	152 703
--Training devices	259	150 317
Tracks (Aerodynamics)		
--Development	308	153 867
Training		
--Bibliography	260	171 332
--Psychological factors	260	147 305
--Theory	260	147 305
Training devices		
--Analysis	260	153 460
--Effectiveness	260	149 642
--Human engineering	259	150 317
Transducers		
--Bibliography	293	153 496
--Performance	293	153 496
--Test methods	293	153 496
Transfer of training	259	150 317
Transformations (Mathematics)	320	152 431
	322	152 762
	323	152 436
--Applications	318	171 334
--Errors	332	152 736
Transistors		
--Applications	300	152 721
--Circuits	299	152 629
--Development	303	152 659
Transition elements		
--Properties	344	152 854
Translations		
--Indexes	268	153 575

Subject	Page	PB Number
Transmission lines		
--Mathematical analysis	345	149 679
Transword	300	152 721
Traveling wave tubes		
--Design	301	152 937
	347	152 996
--Development	295	152 995
Trigger circuits		
--Design	296	147 313
Trigonometric functions		
--Applications	282	152 800
Tropical cyclones		
--Photographic analysis	281	152 870
--Radar analysis	281	152 870
Truth functions	321	152 723
Tularemia		
--Alaska	271	152 619
Tundra truck	313	152 940
Tungsten wire		
--Coatings	329	171 193
Tunneling current	342	152 473
Turbulence		
--Theory	328	149 689
Turbulent boundary layer		
--Mathematical analysis	326	149 688
Turbulent flow		
--Mathematical analysis	328	149 689
Ultra high frequency communication systems		
--Performance	349	152 466
Ultrasonic radiation		
--Attenuation	345	149 690
Ultrasonics		
--Applications	313	161 225
Ultraviolet radiation		
--Measurement	341	149 651
Ultraviolet spectra		
--Analysis	276	152 746
Underwater photography		
--Atlantic Ocean	282	152 908
Underwater sound equipment		
--Calibration	302	152 979
Upper atmosphere		
--Temperature	283	152 669
Uranium isotopes (Radioactive)		
--Spectra	334	153 030
Urine		
--Chemical analysis	270	153 327
--Excretion	269	171 343
Vacuum furnaces		
--Applications	330	161 213
Vacuum systems		
--Applications	270	153 573
Van Allen radiation	258	149 645
Vapor cycle cooling	305	171 345
Variable stars		
--Classification	259	152 171
--Luminescence	259	152 171
Vekua theorem	322	153 275
Vertical take-off planes		
--Design	286	149 666
--Lift	326	153 196

Subject	Page	PB Number
Vertical take-off planes (con)		
--Performance	286	149 666
Vibration		
--Theory	336	149 682
Vibration isolators		
--Test results	310	153 793
Viscoelastic materials	315	150 013
Visual acuity		
--Arctic regions	266	153 326
Visual perception		
--Statistical analysis	269	152 605
Visual signals		
--Detection	289	152 926
--Identification	263	171 313
Voltmeters		
--Calibration	289	171 209
		171 212
		171 213
	291	171 214
		171 215
		171 217
		171 218
	292	171 216
Vortices		
--Mathematical analysis	326	152 479
Vulcanizates		
--Deterioration	317	171 043
--Stresses	316	153 172
Water tunnels		
--Design	328	153 574
Water vapor		
--Measurement	284	150 618
Waveguides		
--Analysis	301	152 652
--Electromagnetic properties	301	152 652
--Equipment	293	152 581
Weather forecasting		
--Test results	280	152 700
Wedges		
--Reflective effects	350	153 088
Weierstrass products	319	152 972
Welds		
--Radiographic analysis	309	152 988
Wetting agents		
--Effectiveness	277	150 619
Whistlers	336	153 279
Wind		
--Measurement	280	152 699
Wind tunnel nozzles		
--Calibration	327	149 344
Wings		
--Lift	326	153 196
Wounds		
--Analysis	271	152 368
X-ray diffraction analysis		
--Applications	269	152 740
--Instrumentation	330	171 348
Zinc		
--Physical effects	344	152 973
Zinc sulfide crystals		
--Electrical properties	345	171 338

NUMBER INDEX

Number	Page
AAL 7-7951, R-2	265
AAL 7-7951, R-3	268
AAL 7-7953, R-1	267
AAL 7-7954, R-1	310
AAL 8-7951, R-7	266
AAL 8-7954, R-2	266
AAL 8-7958	270
AAL 21-01-024	313
AAL 22-1201-0000, SR-1	263
AAL 22-1201-0001, R-1	266
AAL 22-1301-0002	270
AAL 22-1301-0009, R-2	271
AAL 22-1401-0004, RR-1	273
AAL 22-1401-0005	271
AAL TR-57-1	269
AAL TR-57-2	279
AAL TR-57-3	335
AAL TR-57-9	272
AAL TR-57-10	270
AAL TR-57-11	271
AAL TR-57-15	268
AAL TR-57-20	266
AAL TR-57-21	267
AAL TR-57-24	266
AAL TR-57-43	271
AAL TR-58-16	267
AAL TR-59-25	268
AD-53 055	330
AD-114 467	294
AD-126 383	262
AD-144 368	335
AD-144 442	311
AD-146 632	320
AD-146 789	284
AD-150 401	323
AD-157 442	314
AD-207 594	327
AD-210 005	349
AD-210 006	299
AD-211 397	337
AD-211 487	296
AD-211 536	275
AD-211 948	321
AD-213 228	305
AD-213 537	345
AD-213 702	339
AD-213 783	300
AD-214 729	260
AD-215 482	261
AD-215 988	310
AD-216 736	331
AD-217 102	329
AD-217 993	345
AD-219 334	343
AD-219 685	320
AD-219 686	298
AD-219 687	337
AD-219 981	339
AD-220 099	336
AD-220 531	332
AD-220 587	343
AD-220 647	343
AD-220 653	278
AD-220 673	352
AD-220 853	339
AD-225 055	336
AD-225 104	331
AD-225 440	277
AD-225 975	328
AD-226 571	297
AD-226 834	351
AD-226 982	343
AD-227 100	341
AD-227 622	274
AD-228 095	311
AD-228 156	270
AD-228 396	297
AD-228 483	333
AD-229 513	324
AD-229 738	304
AD-229 965	338
AD-230 071	337
AD-230 098	282
AD-230 242	282
AD-230 562	280
AD-230 565	280
AD-230 730	301
AD-230 946	322
AD-231 043	336
AD-231 067	264
AD-231 127	304
AD-231 130	272
AD-231 151	339
AD-231 160	346
AD-231 184	320
AD-231 229	317
AD-231 313	337
AD-231 409	341
AD-231 424	320
AD-231 430	331
AD-231 450	282
AD-231 468	287
AD-231 473	282
AD-231 626	296
AD-231 804	336
AD-231 843	319
AD-231 844	351
AD-231 848	328
AD-231 897	264
AD-232 049	339
AD-232 181	279
AD-232 388	322
AD-232 410	277
AD-232 561	348
AD-232 635	312
AD-232 636	312
AD-232 637	313
AD-232 716	286
AD-232 742	281
AD-232 743	265
AD-232 911	346
AD-232 922	342
AD-232 927	294
AD-232 931	294
AD-232 947	293
AD-233 147	296
AD-233 575	335
AD-233 680	289
AD-233 706	333
AD-233 826	342
AD-234 110	282
AD-234 124	343
AD-234 359	335
AD-234 394	278
AD-234 401	278
AD-234 515	285
AD-234 629	303
AD-234 684	332
AD-234 729	320
AD-234 743	332
AD-234 794	276
AD-234 814	322
AD-234 912	276
AD-234 916	276
AD-234 920	341
AD-234 998	306
AD-235 018	326
AD-235 033	332
AD-235 186	332
AD-235 198	295
AD-235 212	279
AD-235 217	318
AD-235 288	338
AD-235 312	316
AD-235 398	283
AD-235 450	295
AD-235 612	341
AD-235 804	258
AD-235 806	260
AD-235 859	347
AD-236 255	331
AD-236 376	295
AD-236 377	296
AD-236 460	259
AD-236 593	307
AD-236 709	285
AD-236 817	333
AD-236 967	349
AD-236 999	324
AD-237 442	328
AD-237 752	264
AD-237 809	322
AD-238 156	324
AD-238 299	273
AD-238 443	289
AD-238 479	283
AD-238 740	319
AD-238 764	258
AD-238 765	259
AD-238 967	260
AD-238 972	310
AD-239 486	352
AD-239 696	275
AD-239 875	327
AD-240 261	303
AD-240 285	297
AD-240 350	259
AD-240 687	307
AD-240 766	295
AD-240 819	298
AD-240 909	308
AD-240 959	304
AD-241 779	287
AD-241 914	334
AD-241 916	300
AD-242 179	347
AD-242 206	283
AD-242 302	350
AD-242 361	348
AD-242 362	349
AD-242 485	288
AD-242 517	317
AD-242 530	330
AD-242 982	317
AD-243 196	300
AD-243 253	260
AD-243 348	271
AD-243 461	306
AD-243 490	323
AD-243 614	306
AD-243 632	323
AD-243 719	292
AD-243 825	265
AD-243 826	261
AD-243 854	299
AD-243 927	344
AD-243 989	271
AD-244 089	320
AD-244 207	349
AD-244 250	261
AD-244 283	350
AD-244 303	323
AD-244 327	276
AD-244 368	294
AD-244 369	294
AD-244 372	269
AD-244 391	319
AD-244 395	319
AD-244 396	319
AD-244 397	319
AD-244 457	326
AD-244 484	296
AD-244 557	349
AD-244 582	308
AD-244 588	296
AD-244 601	341
AD-244 663	261
AD-244 677	342
AD-244 679	264
AD-244 708	284
AD-244 756	271
AD-244 757	268
AD-244 767	330
AD-244 771	299
AD-244 819L	325
AD-244 833	324
AD-244 855	262
AD-244 856	262
AD-244 858	326
AD-244 881	347
AD-244 882	302
AD-244 888	334
AD-244 900	341
AD-244 901	340
AD-244 902	340
AD-244 903	340
AD-244 904	340
AD-244 906	318
AD-244 907	318
AD-244 921	267
AD-244 945	325
AD-244 958	274
AD-245 017	334
AD-245 023	278
AD-245 060	283
AD-245 061	284
AD-245 064	263
AD-245 072	313
AD-245 078	280
AD-245 088	344
AD-245 089	331
AD-245 116	346
AD-245 117	318
AD-245 119	323
AD-245 132	278
AD-245 157	348
AD-245 166	299
AD-245 179	273
AD-245 182	305
AD-245 194	288
AD-245 196	341
AD-245 197	336
AD-245 205	306
AD-245 206	346
AD-245 209	307
AD-245 220	311
AD-245 221	295
AD-245 229	276
AD-245 231	321
AD-245 232	300
AD-245 234	323
AD-245 253	303
AD-245 278	322
AD-245 313, pt. 1	318
AD-245 313, pt. 2	318
AD-245 343	322
AD-245 344	322
AD-245 388	298
AD-245 389	298
AD-245 399	344
AD-245 445	276
AD-245 468	261
AD-245 472	351
AD-245 485	315
AD-245 486	308
AD-245 497	350
AD-245 500	257
AD-245 503	274
AD-245 504	274
AD-245 509	283
AD-245 513	357
AD-245 524	348
AD-245 565	321
AD-245 575	281
AD-245 581	307
AD-245 607	258
AD-245 618	299
AD-245 619	299
AD-245 623	349
AD-245 668	338
AD-245 671	344
AD-245 673	319
AD-245 689	309
AD-245 690	347
AD-245 703	285
AD-245 723	288
AD-245 724	349
AD-245 726	279
AD-245 769	289
AD-245 788	312
AD-245 856	333
AD-245 928	350
AD-245 991	351
AD-245 992	344
AD-245 996	302
AD-245 997	303
AD-246 000	313
AD-246 012	301
AD-246 037	307
AD-246 186	298
AD-246 394	350
AD-246 419	281
AD-246 590	308
AD-246 593	345
AD-246 601	276
AD-246 678	316
AD-246 796	321
AD-247 193	348
AEDC TN-59-134	338
AEDC TN-60-180	327
AEDC TN-60-182	325
AEDC TN-60-191	306
AEDC TN-60-194	325
AEDC TN-60-202	348
Aero Chem TM-21	310
AFCCDD-TN-60-1014	344
AFCRC-TN-58-201	284
ARCRC-TN-59-469	336
AFCRC-TN-59-624	282
ARCRC-TN-59-625	282
AFCRL-TN-60-216	279
ARCRL-TN-60-442	278
AFCRL-TN-60-459	280
AFCRL-TN-60-455	279
AFCRL-TN-60-457	280
AFCRL-TN-60-458	280
AFCRL-TN-60-461	274
AFCRL-TN-60-462	274
AFCRL-TN-60-470	278
AFCRL-TN-60-483	284
AFCRL-TN-60-575	338
AFCRL-TN-60-606, suppl.	258
AFCRL-TN-60-610	341
AFCRL-TN-60-613	281
AFCRL-TN-60-637	333
AFCRL-TN-60-647	308
AFCRL-TN-60-649	287
AFCRL-TN-60-652	258
AFCRL-TN-60-657	284
AFCRL-TN-60-669	281
AFCRL-TN-60-683	298
AFCRL-TN-60-684	298
AFCRL-TN-60-769	292
AFCRL-TN-60-776	295
AFCRL-TN-60-782	305
AFCRL-TN-60-790	349
AFCRL-TN-60-791	303
AFCRL-TN-60-796	295
AFCRL-TN-60-959	341
AFCRL-TN-60-961	351
AFCRL-TN-60-971	338
AFCRL-TN-60-973	349
AFCRL-TN-60-974	301
AFCRL-TN-60-975	283
AFCRL-TN-60-976	296
AFCRL-TN-60-987	350
AFCRL-TN-60-988	338
AFCRL-TN-60-990	347
AFCRL-TN-60-994	346
AFCRL-TN-60-995	304
AFCRL-TN-60-1103	346
AFCRL-TN-60-1104	298
AFCRL-TN-60-1125(I)	283
AFCRL-TN-60-1133	300
AFCRL-TR-60-131	297
AFCRL-TR-60-137	288
AFCRL-TR-60-169	288
AFCRL-TR-60-171	349

Number	Page
AFCRL-TR-60-185	350
AFCRL-TR-60-240, pt. 3	281
AFCRL-TR-60-276	276
AFCRL-TR-60-287	257
AFCRL-TR-50-294-1	340
AFCRL-TR-60-294-2	340
AFCRL-TR-60-294-3	340
AFCRL-TR-60-294-4	340
AFCRL-TR-60-407	307
AFCRL-TR-60-409	257
AFIT-57-4	310
AFMDC-TR-60-19	307
AFMDC-TR-60-22	305
AFMDC-TR-60-27	263
AFMDC-TR-60-28	259
AFOSR-TN-58-1093	327
AFOSR-TN-59-528	263
AFOSR-TN-59-573	276
AFOSR-TN-59-720	320
AFOSR-TN-59-1260	322
AFOSR-TN-59-1298	301
AFOSR-TN-60-283	322
AFOSR-TN-60-284	341
AFOSR-TN-60-286	260
AFOSR-TN-60-288	332
AFOSR-TN-60-300	318
AFOSR-TN-60-303	332
AFOSR-TN-60-329	320
AFOSR-TN-60-330	276
AFOSR-TN-60-354	332
AFOSR-TN-60-379	334
AFOSR-TN-60-487	318
AFOSR-TN-60-541	319
AFOSR-TN-60-600	302
AFOSR-TN-60-642	323
AFOSR-TN-60-650	327
AFOSR-TN-60-701	275
AFOSR-TN-60-718	322
AFOSR-TN-60-744	322
AFOSR-TN-60-748	303
AFCRL-TN-60-756	320
AFCRL-TN-60-780	342
AFOSR-TN-60-807	319
AFOSR-TN-60-855	276
AFOSR-TN-60-867	323
AFOSR-TN-60-884	345
AFOSR-TN-60-911	319
AFOSR-TN-60-912	319
AFOSR-TN-60-938	326
AFOSR-TN-60-945	348
AFOSR-TN-60-965	344
AFOSR-TN-60-1024	294
AFOSR-TN-60-1026, pt. 1	318
AFOSR-TN-60-1026, pt. 2	318
AFOSR-TN-60-1042	350
AFOSR-TN-60-1061	318
AFOSR-TN-60-1085	265
AFOSR-TN-60-1090	294
AFOSR-TN-60-1096	322
AFOSR-TN-60-1119	341
AFOSR-TN-60-1121	331
AFOSR-TN-60-1129	324
AFOSR-TN-60-1138	319
AFOSR-TN-60-1150	276
AFOSR-TN-60-1165	325
AFOSR-TN-60-1198	347
AFOSR-TN-60-1235	336
AFOSR-TN-60-6	326
AFOSR-TR-60-24	275
AFOSR-TR-60-43	314
AFOSR-TR-60-119	274
AFOSR-TR-60-125	346
AFOSR-TR-60-128	341
AFOSR-TR-60-130	344
AFOSR-TR-60-134	268
AFOSR-TR-60-135	326
AFPTRC-TN-57-52	262
AFSAM-60-66	273
AFSAM-60-79	267
AFSAM-60-80	265
AFSEC-TN-60-25	334
AIR-314-60-IR-106	260
AMRG PM-24	280
AMRG PM-25	280
ARF-1099-15	341
ARF-1146-6	337
ARL-TN-60-126	318
ARL-TN-60-142	327
ARL-TN-60-144	333
ARL-TR-60-274, pt. 1	347
ARL-TR-60-279	312
ARL-TR-60-281	309
ARL-TR-60-296	315
ARL-TR-60-301	345
ARPA Order 6-58, Task 11	275
ARPA Order 80-59	342
ARPA Order 106-60	349
ASRDL-2121	317
ASRDL-2133	288
ASRDL-2145	317
ASRDL T-1459, supp. 1	352
ASRDL T-1473	352
ASRDL T-1479	352
ASRL TR-86-1	285
Avco RR-85	346
AWSM-105-39	279
AWSM-105-39, Jan 53, superseded	279
BBN-721	328
BN-196	320
BN-218	324
BRL-1113	325
BRL MR-1241	306
BRL MR-1299	306
BRL TN-1337	307
BTL-27424-K	341
BTL-27424-M	341
BTL-27424-N	342
BTL-27480-K	289
BTL-27480-L	289
BuMed-MR005. 15-0002.7, R-12	269
BuMed MR005. 15-0002.11, R-1	269
BuPers TB-60-8	261
CAL AD-1052-A-11	326
CIT E-79-2	328
CRDL SP-1-20	306
CRDL SP-1-21	306
CRDLR-3019	306
CRDLR-3024	271
CU-1-60	282
CU-8-60	292
CWL RR-111	272
CWL TM-32-41	339
CWLR-2347	272
DA 33-008-ORD-1968, R-5	285
DASA-526	334
DMIC-M-63	330
DMIC M-75	313
DMIC-M-76	329
DMIC-M-77	311
DMIC-138	330
DOFL-TR-870	293
DOFL-TR-878	293
DOFL-TR-879	293
DOFL-TR-881	337
DOFL-TR-887	293
DOFL-TR-891	311
DOMIIT-1-11	324
DSR-7484	348
	349
DTMB-597, superseded	257
DTMB-1052	328
DTMB-1160	257
DTMB-1360	310
ECA-192, 04	294
EERL-6-38	283
EES-820 052	310
EM-155	320
EM-162	349
EOS-290	307
EOS-400-2Q-1	342
ERL-99	296
ERL-100	295
ERL-101	296
ERL-103	295
ES-29(XE-3)	352
ESL-MIT-7591-R-2	286
FDRG-60-3	296
FRL-TR-12	315
FRL-TR-13	316
GNE-57-5	310
GRD AFSG-94	284
GRD AFSG-125	278
GRD AFSG-126	279
GRD RN-38	278
HR-59-474	343
HR-60-412	343
HSR-RR-60/4-SE	334
HT-6	344
Hum RRO-TE-65	261
Hum RRO TR-64	261
IER-60-27	295
IER-60-265	296
IER-60-267	295
IER-60-269	296
IER-60-271	295
IER-60-272	319
IER-60-284	338
IER-60-289	295
IER-131-8	324
IMM NYU-260	324
IRL-131	284
IRL-139	298
IRL-140	298
IRL-141	283
ITT-3029	352
JPL M-20-194	307
JPL R-20-127	311
LIR TR-137	337
LIR TR-138	298
LL-21G-0015	308
LL-21G-0026	321
LL-22G-0042	323
LL-22G-0054	321
LL-25G-0001	299
LL-25G-0005	351
LL-25G-0019	300
LL-30G-0011	349
LL-46G-0007	298
LL-51G-0018	320
LL-58G-0015	264
LL-82G-0023	344
LL-85G-0008	344
LL TR-190	349
LL TR-194	299
LL TR-223	299
LL TR-224	299
LL TR-226	299
LL TR-227	299
LMSD-311 864	258
LMSD-703 029	308
Lock NR-60	333
MAC-7064	286
MEDEW-RS-3-59	271
ML-695	301
ML-733	301
ML-745	301
ML(UM)-2112	282
MRC TSR-63	324
MRI R-523.38-59	345
MRI R-736-59	350
MRL(OMRO)-89	344
MSEE-60-22	324
MUP TR-167	332
MUP TR-168	332
NAA-MD59-277	257
NADC-MA-6030	269
NADC-MA-6031	269
NAMC-AML-AE-1096	330
NAMC-AML-AE-4195, pt.2	329
NATC ET315-127	301
NAVORD-5765	345
NAVORD-6415	337
NAVORD-6495	331
NAVORD-6921	321
NAVTRADEVCEN-9-11-1	260
NAVTRADEVCEN-1809-00-4	259
NAVWEPS-7016	325
NAVWEPS-7094	280
NAVWEPS-7096	315
NAVWEPS-7098	308
NAVWEPS-7104	280
NAVWEPS-7254	321
NAVWEPS-7264	321
NAVWEPS-7289	308
NAVWEPS-7290	302
NAVWEPS-7302	321
NAVWEPS-7318	321
NAVWEPS SSL-AE-01	291
NAVWEPS SSL-AE-03	291
NAVWEPS SSL-AE-25	289
NAVWEPS SSL-AI-02	290
NAVWEPS SSL-AR-06	291
NAVWEPS SSL-BC-01	289
NAVWEPS SSL-BC-02	290
NAVWEPS SSL-BC-03	290
NAVWEPS SSL-BC-04	290
NAVWEPS SSL-BC-05	290
NAVWEPS SSL-BE-01	291
NAVWEPS SSL-BE-02	291
NAVWEPS SSL-BE-03	289
NAVWEPS SSL-BE-05	289
NAVWEPS SSL-BF-06	292
NAVWEPS SSL-BL-01	292
NAVWEPS SSL-BR-02	291
NAVWEPS SSL-BR-03	291
NAVWEPS SSL-BR-04	290
NAVWEPS SSL-CL-02	292
NAVWEPS SSL-CR-02	292
NAVWEPS SSL-HV-05	292
NAVWEPS SSL-NF-02	328
NAVWEPS SSL-NM-03	336
NBS TN-18-7	350
NCEL R-091	313
NCEL R-094	313
NM 001 110 500.37	268
NML Ref-60-1	283
NOL MDM-1	321
NOL MDM-13	321
NOL MDM-14	321
NOL MDM-15	321
NOR-60-16	287
NOTS-2113	337
NOTS STS-3	308
NOTS TM-786	313
NOTS TM-1113	321
NOTS TP-2377	341
NOTS TP-2379	325
NOTS TP-2513	230
NOTS TP-2517	315
NOTS TP-2521	308
NOTS TP-2528	280
NRCC LR-186A	326
NRCC LR-274	326
NRCC LR-288	326
NRCC MI-822	277
NRCC MP-17	315
NRL-3998	302
NRL-4037	302
NRL-5534	324
NRL-5547	316
NRL-5551	284
NRL-5556	277
NRL-5557	302
NRL-5560	309
NRL-5563	309
NSF G-7368	281
NSF G-10715	323
NSF G-Y/32.48/272	308
NSL-437	327
NWPW-T-6-59	331
NYU TR-400-14	302
NYU TR-400-16	303
OORR-770-...	275
OORR-1469.1	320
OORR-1640.9M	321
OORR-2207.5-E	294
OORR-2207.6-E	294
OSURF 716-7	282
OSURF 716-8	282
OSURF-823-1	259
OSURF-973-2	283
OSW RDPR-46	285
OTAC RR-27	307
PB 147 305	260
PB 147 310	324
PB 147 313	296
PB 147 314	295
PB 147 535	328
PB 147 554	285
PB 147 558	349
PB 148 004	264
PB 148 066	322
PB 148 282	300
PB 148 405	324
PB 148 426	283
PB 148 494	258
PB 148 495	259
PB 148 500	319
PB 148 609	323
PB 148 777	310
PB 149 211	259
PB 149 297	324
PB 149 344	327
PB 149 628	343
PB 149 629	303
PB 149 630	303
PB 149 631	277
PB 149 633	306
PB 149 634	272
PB 149 635	272
PB 149 636	294
PB 149 637	294
PB 149 638	278
PB 149 639	339
PB 149 640	328
PB 149 641	339
PB 149 642	260
PB 149 643	341
PB 149 644	320
PB 149 645	258
PB 149 646	318
PB 149 647	303
PB 149 649	322
PB 149 650	332
PB 149 651	341
PB 149 654	337
PB 149 655	329
PB 149 657	340
PB 149 658	278
PB 149 659	278
PB 149 663	321
PB 149 664	275
PB 149 665	314
PB 149 666	286
PB 149 668	279
PB 149 675	276
PB 149 677	327
PB 149 678	276
PB 149 679	345
PB 149 680	339
PB 149 681	276
PB 149 682	336
PB 149 683	274
PB 149 684	343
PB 149 685	351
PB 149 686	326
PB 149 687	275
PB 149 688	336
PB 149 689	328
PB 149 690	345
PB 149 691	324
PB 149 692	342
PB 149 693	304
PB 149 694	296
PB 149 695	343
PB 149 696	343
PB 149 703	293
PB 149 704	309
PB 149 706	342
PB 149 708	297
PB 149 709	297
PB 149 710	297
PB 149 712	304
PB 149 718	286
PB 149 721	341
PB 149 722	289
PB 149 723	341
PB 149 724	342
PB 149 725	337
PB 149 726	298
PB 149 728	336
PB 149 729	320
PB 149 730	320
PB 149 732	332
PB 149 733	332
PB 149 736	331
PB 149 737	332
PB 149 738	345

Page	Number	Page	Number	Page	Number	Page	Number	Page
302	149 739	331	152 713	341	152 908	282	153 344	269
303	149 740	349	152 714-1	340	152 911	333	153 345	279
275	149 741	299	152 714-2	340	152 912	346	153 346	335
320	149 756	324	152 714-3	340	152 913	264	153 348	272
321	149 830	316	152 714-4	340	152 916	331	153 349	270
294	149 963	316	152 715-1	318	152 922	293	153 350	271
294	150 013	315	152 715-2	318	152 923	337	153 351	266
282	150 035	349	152 721	300	152 925	344	153 352	267
282	150 036	348	152 722	323	152 926	289	153 353	266
259	150 317	259	152 723	321	152 929	350	153 382	322
283	150 618	284	152 724	313	152 930	281	153 387	263
285	150 619	277	152 725	344	152 932	344	153 391	280
307	150 961	317	152 728	288	152 933	351	153 460	260
260	151 097	330	152 729	307	152 934	320	153 476	315
324	151 377-7	350	152 730	336	152 935	300	153 496	293
296	152 137	348	152 731	341	152 936	258	153 506	262
295	152 171	259	152 732	306	152 937	301	153 570	335
328	152 254	292	152 734	310	152 938	301	153 571	274
285	152 368	271	152 735	295	152 939	308	153 572	262
349	152 369	319	152 736	322	152 940	313	153 573	270
264	152 371	319	152 737	322	152 942	313	153 574	328
322	152 375	319	152 738	327	152 946	258	153 575	268
300	152 376	319	152 740	269	152 947	326	153 576	302
324	152 409	299	152 741	295	152 948	299	153 577	302
283	152 418	350	152 742	346	152 949	299	153 587	310
258	152 431	320	152 743	305	152 951	283	153 588	277
259	152 436	323	152 744	263	152 952-1	280	153 589	273
319	152 446	314	152 746	276	152 952-2	280	153 596	323
323	152 460	268	152 747	323	152 955	347	153 597	323
310	152 462	344	152 749	312	152 958	297	153 606	277
259	152 463	330	152 750	299	152 959	312	153 620	316
324	152 466	349	152 756	262	152 960	338	153 621	334
327	152 470	269	152 757	262	152 962	337	153 622	333
343	152 473	342	152 759	308	152 963	350	153 624	285
303	152 477	270	152 761	322	152 966	348	153 625	282
303	152 478	276	152 762	322	152 967	285	153 626	347
277	152 479	326	152 763	267	152 968	259	153 629	287
306	152 486	294	152 764	265	152 972	319	153 630	286
272	152 489	294	152 767	275	152 973	344	153 631	261
272	152 522	308	152 768	333	152 977	279	153 726	257
294	152 523	349	152 769	281	152 979	302	153 790	333
294	152 529	326	152 770	276	152 981	351	153 791	311
278	152 535	265	152 772	274	152 984	288	153 793	310
339	152 536	305	152 773	274	152 985	288	153 867	308
328	152 537	327	152 774	280	152 986	304	153 882	330
339	152 541	281	152 775	280	152 987	349	153 883	313
260	152 544	345	152 776	305	152 988	309	153 884	284
341	152 556	325	152 777	338	152 992	296	153 885	307
320	152 557	327	152 778	307	152 993	350	161 213	330
258	152 564	352	152 779	325	152 994	295	161 225	313
318	152 565	352	152 782	265	152 995	300	161 226	329
303	152 580	261	152 783	261	152 996	347	161 227	311
322	152 581	293	152 787	351	152 997	352	161 371-9	273
332	152 595	306	152 788	261	153 003	288	161 894-1	304
341	152 596	306	152 789	348	153 030	334	161 968	302
337	152 597	306	152 791	303	153 033	275	171 029	272
329	152 599	271	152 799	282	153 034	302	171 034	316
340	152 602	325	152 800	282	153 035	303	171 041	332
278	152 603	296	152 821	334	153 037	268	171 042	317
278	152 605	269	152 823	298	153 046	281	171 043	317
321	152 606	318	152 824	298	153 050	283	171 044	330
275	152 607	318	152 825	315	153 053	321	171 046	309
314	152 609	324	152 826	308	153 058	306	171 047	314
286	152 610	296	152 831	287	153 062	309	171 050	311
279	152 613	279	152 833	301	153 063	280	171 051	309
276	152 617	268	152 834	257	153 064	280	171 190	281
327	152 618	268	152 839	308	153 068	335	171 191	341
276	152 619	271	152 840	309	153 070	335	171 192	285
345	152 621	264	152 841	298	153 071	332	171 193	329
339	152 623	284	152 842	349	153 085	275	171 194	293
276	152 624	341	152 843	325	153 088	350	171 195	286
336	152 625	287	152 845	307	153 089	338	171 196	258
274	152 626	261	152 846	257	153 090	276	171 197	352
343	152 628	346	152 847	301	153 091	276	171 198	329
351	152 629	299	152 854	344	153 095	298	171 199	286
326	152 630	273	152 856-1	312	153 096	288	171 200	292
275	152 631	274	152 856-2	312	153 100	307	171 201	292
336	152 632	325	152 856-3	313	153 109	325	171 202	336
328	152 633	347	152 857	327	153 110	264	171 203	328
345	152 652	301	152 858	328	153 158	277	171 204	292
324	152 655	293	152 859	295	153 172	316	171 205	290
342	152 658	289	152 860	296	153 195	326	171 206	291
304	152 659	303	152 861	295	153 196	326	171 207	291
296	152 660	297	152 862	314	153 226	305	171 208	292
343	152 661	334	152 863	339	153 271	262	171 209	289
343	152 664	338	152 864	339	153 272	311	171 210	290
293	152 668	300	152 868	338	153 273	294	171 211	291
309	152 669	283	152 869	336	153 274	323	171 212	289
342	152 670	304	152 870	281	153 275	322	171 213	289
297	152 671	297	152 880	331	153 277	337	171 214	291
297	152 672	298	152 882	337	153 278	259	171 215	291
297	152 673	307	152 883	317	153 279	336	171 216	292
304	152 674	317	152 885	286	153 320	313	171 217	291
286	152 675	317	152 888	264	153 325	263	171 218	291
341	152 683	344	152 889	265	153 326	266	171 219	289
289	152 684	278	152 891	343	153 327	270	171 220	290
341	152 690	267	152 892	282	153 328	266	171 221	290
342	152 691	331	152 893	282	153 330	271	171 222	290
337	152 694	346	152 894	320	153 331	273	171 223	290
298	152 695	267	152 896	319	153 332	271	171 300	275
336	152 696	284	152 897	351	153 336	265	171 301	331
320	152 697	283	152 898	287	153 337	268	171 302	326
320	152 698	334	152 900	320	153 338	267	171 303	315
332	152 699	280	152 901	346	153 339	310	171 304	269
332	152 700	280	152 905	279	153 341	266	171 305	312
331	152 701	278	152 906	328	153 342	266	171 306	315
332	152 703	263	152 907	283	153 343	270	171 307	329
345								

Number	Page
171 308	311
171 309	273
171 310	277
171 311	314
171 312	318
171 313	263
171 315	352
171 327	321
171 328	287
171 329-1	348
171 331	329
171 332	260
171 333	265
171 334	318
171 335	333
171 336	347
171 337	309
171 338	345
171 339	324
171 340	342
171 341	335
171 342	339
171 343	269
171 344	285
171 345	305
171 348	330
171 349	321
171 350	321
171 351	321
171 352	308
171 353	302
171 354	321
171 355	321
171 356	345
PHS G-M-743(C5)	323
PIB-453. 38	345
PIB-664	350
PIB-710	301
PIBAL-580	325
PIBAL-609	327
PIBMRI-782-59	301
PIBMRI-808-60	338
PIBMRI-831-60	313
Plasma FR080-5961	350
PLASTEC-3	316
PPL-TR-60-2	312
PPL-TR-60-3	347
PRB TRN-107	262
PRB TRN-108	262
PRL(STL) 9-18	346
PSI-3000:15-25-Q	303
PSNS-ML-P-300-10	314
PU AEL-442	327
PU AEL-496	287
PU AEL-517	287
PU AEL-519	327
QFEA MRS-5901	336
QFEA R-4	336
QKK725-OQ645	303
R&C-60-1-2	259
R60SD456	312
RADC-TN-60-199	313
RADC-TN-60-201	301
RADC-TN-60-202	301
RADC-TR-57-85	294
RADC-TR-58-111, sup. 1	304
RADC-TR-59-53	300
RIAL-60-2561	317
RIAL-60-2562	332
RIAL-60-2563	317
RIAL-60-2856	317
RIAL-60-3203	314
RPI MathRep-29	322
RS-15	349
S/TD-1735, V. 1	312
S/TD-1735, v. 2	312
S/TD-1735, v. 3	313
SEP-PSD59-4	304
SIPRE TR-12, v. 14	281
Squid PR-96-P	328
SRI-2937	304
TCC-E120-59	316
TED ADC RS-7045 (5915-A)	269
TED NAM AE 4177, FR	330
TED-PTR-EL-9008, R-1	301
TRG-121-SR-2	338
TRG-131-SR-2	305
UMN CR-25	258
UMN CR-26	258
UMN CR-27	259
UMRI-2820-4-T	300
UMRI-2900-57-T	269
UMRI-2900-202-T	305
USCEC-R-73-201	327
USNRDL AD-128(C)	277
USNRDL-TR-62	274
USNRDL-TR-111	334
USNRDL-TR-152	335
USNRDL-TR-277	335
USNRDL-TR-289	335
USNRDL-TR-396	332
USNRDL-TR-408	333
USNRDL-TR-421	273
USRL RR-52	302
UW ER-213-10	287
WADC-TN-56-187	286
WADC-TN-59-142	270
WADC-TR-56-585, pt. 2	287
WADC-TR-58-95, pt. 3	285
WADC-TR-58-476, v. 1	348
WADC-TR-59-36	261
WADC-TR-59-526, pt. 2	329
WADC-TR-59-570	345
WADC-TR-59-747	330
WADC-TR-59-772	338
WADD-TN-60-136	263
WADD-TN-60-137	262
WADD-TN-60-155	341
WADD-TN-60-161	305
WADD-TN-60-165	324
WADD-TN-60-183	267
WADD-TN-60-197	329
WADD-TN-60-212	264
WADD-TN-60-213	261
WADD-TN-60-217	262
WADD-TR-59-469	342
WADD-TR-59-708, pt. 1	293
WADD-TR-59-708, pt. 2	286
WADD-TR-60-6	311
WADD-TR-60-118	258
WADD-TR-60-204	339
WADD-TR-60-216	352
WADD-TR-60-278	329
WADD-TR-60-309	286
WADD-TR-60-333	275
WADD-TR-60-384	331
WADD-TR-60-445	326
WADD-TR-60-461	315
WADD-TR-60-511, pt. 1	314
WADD-TR-60-521	263
WADD-TR-60-544	277
WADD-TR-60-604	273
WADD-TR-60-621	269
WADD-TR-60-637	269
WADD-TR-60-661	318
WADD-TR-60-673	263
WAL 140. 5/1	309
WAL 143/14-50	345
WAL-711. 2/1	309
WAL-834. 21/2	330
WHOI Ref. 59-63	281
WU Ref. 59-6	283

U. S. DEPARTMENT OF COMMERCE FIELD OFFICES

SERVE THE BUSINESS COMMUNITY

The Department of Commerce maintains Field Offices to enable the business community to avail itself locally of Government facilities designed to promote commerce. Working closely with various units in the Department and, when necessary, with other Government agencies, the Field Offices provide business services to manufacturers, wholesalers, retailers, trade publications, trade associations, advertising agencies, research groups, financial institutions, and exporters and importers.

Experienced personnel will gladly assist in the solution of specific problems, explain the scope and meaning of regulations administered by the Department, and provide practical assistance in the broad field of domestic and foreign commerce. Field offices act as official sales agents of the Superintendent of Documents, and maintain an extensive business reference library containing periodicals, directories, publications and reports from official as well as private sources.

Among the many services which businessmen have found of value are:

GENERAL

- Management and business aids
- Establishing a new business

BASIC ECONOMIC DATA

- Census data, with national and often State and regional breakdowns, on manufacturing, wholesaling, retailing, service industries, employment and unemployment, population, housing, agriculture
- Basic records of national income and product, regional trends, balance of payments, foreign aid

MARKETING AND DISTRIBUTION

- Development and maintenance of markets
- Distribution channels, facilities and services
- Marketing and distribution statistics

PRODUCTION

- Modernization of plant processes and other technological aids
- Development of new products
- Government-owned patents for free license
- Commodity standards

FOREIGN TRADE AND INVESTMENT

- Tariff and exchange regulations
- Import and export quotas, licensing regulations
- Statistics on imports and exports
- Investment and trade opportunities abroad
- Economic conditions in foreign countries

COOPERATIVE OFFICES

To make the services of the Department of Commerce more widely available, agreements have been entered into with more than 750 Chambers of Commerce, Manufacturers Associations, and similar business groups under which these organizations have become official Cooperative Offices of the Department. If specific information is not on hand in the Cooperative Office, your problem will be referred to the nearest Departmental field office.

Department Field Offices

ALBUQUERQUE, N. MEX., Post Office Bldg.
ATLANTA 3, GA., 66 Luckie Street NW.
BOSTON 9, MASS., Post Office and Courthouse
BUFFALO 3, N. Y., 117 Ellicott Street
CHARLESTON 4, S. C., Sergeant Jasper Bldg., West End Broad Street
CHEYENNE, WYO., Federal Office Bldg.
CHICAGO 6, ILL., 226 West Jackson Blvd.
CINCINNATI 2, OHIO, Post Office and Courthouse
CLEVELAND 14, OHIO, 1100 Chester Avenue
DALLAS, TEX., 500 South Ervay Street
DENVER 2, COLO., New Custom House
DETROIT 26, MICH., Federal Bldg.
GREENSBORO, N. C., Post Office Bldg.
HOUSTON 2, TEX., 430 Lamar Avenue
JACKSONVILLE 1, FLA., Federal Bldg.
KANSAS CITY 6, MO., Federal Office Bldg.
LOS ANGELES 15, CALIF., 1031 South Broadway
MEMPHIS 3, TENN., 22 North Front Street
MIAMI 32, FLA., 300 NE. First Avenue
MINNEAPOLIS 1, MINN., Metropolitan Bldg.
NEW ORLEANS 12, LA., 333 St. Charles Avenue
NEW YORK 17, N. Y., 110 E. 45th Street
PHILADELPHIA 7, PA., 1015 Chestnut Street
PHOENIX, ARIZ., 137 N. Second Avenue
PITTSBURGH 22, PA., 107 Sixth Street
PORTLAND 4, OREG., Old U. S. Courthouse
RENO, NEV., 1479 Wells Avenue
RICHMOND 19, VA., 1103 East Main Street
ST. LOUIS 1, MO., New Federal Bldg.
SALT LAKE CITY 1, UTAH, 222 S. W. Temple Street
SAN FRANCISCO 11, CALIF., 555 Battery Street
SAVANNAH, GA., U. S. Courthouse and Post Office Bldg.
SEATTLE 4, WASH., Federal Office Bldg.

For local telephone listing, consult section devoted to U. S. Government

UNITED STATES
GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON 25, D. C.

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE TO AVOID
PAYMENT OF POSTAGE, $300